Smart Licensing Using Policy for Cisco Catalyst 9000 Series Switches

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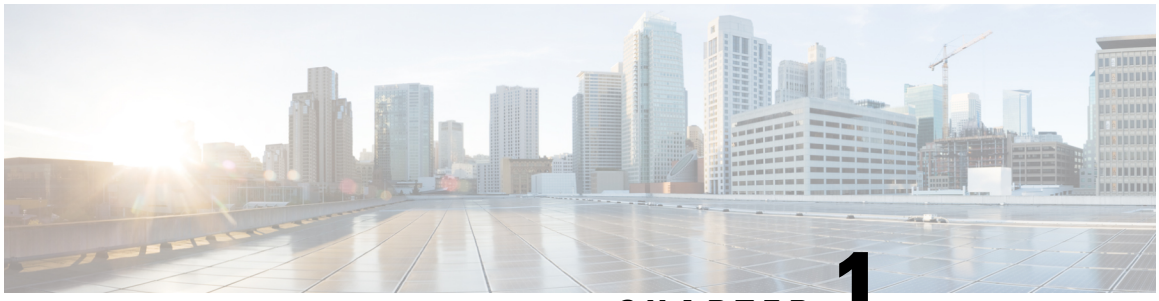


CHAPTER 1

Information About Smart Licensing Using Policy

Smart Licensing Using Policy is an enhanced version of Smart Licensing, with the overarching objective of providing a licensing solution that does not interrupt the operations of your network, rather, one that enables a compliance relationship to account for the hardware and software licenses you purchase and use.

This document focuses on conceptual, configuration, and troubleshooting information for Smart Licensing Using Policy on Cisco Catalyst 9000 Series Switches.

Benefits of Smart Licensing Using Policy

With this solution, preliminary steps such as registration or generation of keys are not required, unless you use an export-controlled or an enforced license. This means you can configure licenses and then move on to configuring the product features right-away.

Consistency is provided through a uniform licensing experience across campus, industrial ethernet switching, routing, and wireless devices - all of which run Cisco IOS XE software.

Visibility and manageability are ensured through tools, telemetry, and product tagging, to know what is in-use.

Flexible, time series reporting is another key benefit where you have multiple options when it comes to ensuring compliance. Depending on an organization's network requirements and security policy, the connection to Cisco Smart Software Manager (Cisco SSM) may be a direct connection over the internet, or through mediated access, or through offline communication for air-gapped networks.

Supported Products

This section provides information about the Cisco IOS-XE product instances that are within the scope of this document and support Smart Licensing Using Policy. All models (Product IDs or PIDs) in a product series are supported – unless indicated otherwise.

Table 1: Supported Product Instances: Cisco Catalyst Access, Core, and Aggregation Switches

Cisco Catalyst Access, Core, and Aggregation Switches	When Support was Introduced
Cisco Catalyst 9200 Series Switches	Cisco IOS XE Amsterdam 17.3.2a
Cisco Catalyst 9300 Series Switches	Cisco IOS XE Amsterdam 17.3.2a
Cisco Catalyst 9400 Series Switches	Cisco IOS XE Amsterdam 17.3.2a
Cisco Catalyst 9500 Series Switches	Cisco IOS XE Amsterdam 17.3.2a
Cisco Catalyst 9600 Series Switches	Cisco IOS XE Amsterdam 17.3.2a

Key Concepts of Smart Licensing Using Policy

This section explains the important concepts that help with understanding how the Smart Licensing Using Policy solution is designed to work.

License Enforcement Types

All licenses have an enforcement type. The enforcement type indicates if a license requires authorization before use, or not. These are the enforcement types.

Unenforced or Not Enforced

Unenforced licenses do not require authorization before use in air-gapped networks, or registration, in connected networks. The terms of use for such licenses are as per the general terms.

Cisco DNA licenses available on all Cisco Catalyst 9000 Series Switches are examples of unenforced licenses.

Enforced

Licenses that belong to this enforcement type require authorization before use. The required authorization is in the form of an authorization code which must be installed in the corresponding product instance.

None of the licenses available on Cisco Catalyst 9000 Series Switches belong to this enforcement type.

An example of an enforced license is the Media Redundancy Protocol (MRP) Client license, which is available on Cisco's Industrial Ethernet Switches.

Export-Controlled

Licenses that belong to this enforcement type are restricted by U.S. trade-control laws and require authorization before use. The required authorization is in the form of an authorization code, which must be installed on the device.

Cisco may pre-install export-controlled licenses when ordered with hardware purchase.

An example of an export-controlled license is the High Security (HSECK9) key, which is available on *certain* Cisco Catalyst 9000 Series Switches.

For information about all the licenses that are available on Cisco Catalyst 9000 Series Switches, see Available Licenses.

License Duration

This refers to the duration or term for which a purchased license is valid. A given license may belong to any one of the enforcement types and have one of these validities:

- Perpetual: There is no expiration date for such a license.
- Subscription: The license is valid only until a certain date.

Authorization Code

The Smart Licensing Authorization Code (SLAC) allows activation and continued use of a license that is export-controlled or enforced.

Installing SLAC on the device, enables the use of the license.

If an authorization code is required for the license you are using, you can request one from CSSM. For detailed information about the HSECK9 key on supported products, see When an HSEX9 Key is Required and Which Product Supports It.

Table 2: Licenses that Require SLAC, Supported Platforms, and Releases

Export-Controlled License or Key Which Requires SLAC	Enforcement Type	Supporting Products and When Support was Introduced
HSECK9	Export-controlled	Cisco Catalyst 9300X Series Switches, starting from Cisco IOS XE Bengaluru 17.6.2.
		Cisco Catalyst 9500X Series Switches, starting from Cisco IOS XE Cupertino 17.8.1.
		Cisco Catalyst 9600 Series 40-Port 50G, 2-Port 200G, 2-Port 400G Line Card (C9600-LC-40YL4CD) with Cisco Catalyst 9600 Series Supervisor Engine 2 (C9600X-SUP-2), starting from Cisco IOS XE Cupertino 17.8.1.
		Cisco Catalyst 9400 Series Supervisor 2 and 2XL Modules (C9400X-SUP-2 and C9400X-SUP-2XL) of the Cisco Catalyst 9400 Series Switches, starting with Cisco IOS XE Dublin 17.11.1.

You can also remove and return a SLAC to return the license to the license pool in Cisco SSM. But in order to do this, the feature that uses the license must be disabled first. You cannot remove or return a SLAC if it is in-use.

SLR Authorization Codes

SLR authorization codes are from the older Smart Licensing model. You cannot request a new SLR in the Smart Licensing Using Policy environment, because the notion of "reservation" does not apply. If you are in an air-gapped network, the No Connectivity to Cisco SSM and No CSLU, on page 19 topology applies instead.

Any existing SLR authorization codes are carried-over on upgrade or migration to Smart Licensing Using Policy, and continue to be supported. For more information, see Returning an Authorization Code, on page 115.

Policy

A policy provides the product instance with these reporting instructions:

- License usage report acknowledgement requirement (Reporting ACK required): The license usage report is known as a RUM Report and the acknowledgement is referred to as an ACK (SeeRUM Report and Report Acknowledgement). This is a yes or no value which specifies if the report for this product instance requires CSSM acknowledgement or not. The default policy is always set to "yes".
- First report requirement (days): The first report must be sent within the duration specified here.

  If the value here is zero, no first report is required.
- Reporting frequency (days): The subsequent report must be sent within the duration specified here.

  If the value here is zero, it means no further reporting is required *unless* there is a usage change.
- Report on change (days): In case of a change in license usage, a report must be sent within the duration specified here.

  If the value here is zero, no report is required on usage change.

  If the value here is not zero, reporting *is* required after the change is made. All the scenarios listed below count as changes in license usage on the product instance:

  - Changing licenses consumed (includes changing to a different license, and, adding or removing a license).
  - Going from consuming zero licenses to consuming one or more licenses.
  - Going from consuming one or more licenses to consuming zero licenses.

Note If a product instance has *never* consumed a license, reporting is not required even if the policy has a non-zero value for any of the reporting requirements (First report requirement, Reporting frequency, Report on change).

Understanding Policy Selection

CSSM determines the policy that is applied to a product instance. Only one policy is in use at a given point in time. The policy and its values are based on a number of factors, including the licenses being used.

`Cisco default` is the default policy that is always available in the product instance. If no other policy is applied, the product instance applies this default policy. The table below (Table 3: Policy: Cisco default, on page 5) shows the `Cisco default` policy values.

While you cannot configure a policy, you can request for a customized one, by contacting the Cisco Global Licensing Operations team. Go to Support Case Manager. Click **OPEN NEW CASE** > Select **Software Licensing**. The licensing team will contact you to start the process or for any additional information. Customized policies are also made available through your Smart account in CSSM.

Note To know which policy is applied (the policy in-use) and its reporting requirements, enter the **show license all** command in privileged EXEC mode.

Table 3: Policy: Cisco default

Policy: `Cisco default`	**Default Policy Values**
Export (Perpetual/Subscription) **Note** Applied only to licenses with enforcement type "Export-Controlled".	Reporting ACK required: Yes First report requirement (days): 0 Reporting frequency (days): 0 Report on change (days): 0
Enforced (Perpetual/Subscription) **Note** Applied only to licenses with enforcement type "Enforced".	Reporting ACK required: Yes First report requirement (days): 0 Reporting frequency (days): 0 Report on change (days): 0
Unenforced/Non-Export Perpetual[1]	Reporting ACK required: Yes First report requirement (days): 365 Reporting frequency (days): 0 Report on change (days): 90
Unenforced/Non-Export Subscription	Reporting ACK required: Yes First report requirement (days): 90 Reporting frequency (days): 90 Report on change (days): 90

[1] For Unenforced/Non-Export Perpetual: the default policy's first report requirement (within 365 days) applies only if you have purchased hardware or software from a distributor or partner.

RUM Report and Report Acknowledgement

A Resource Utilization Measurement report (RUM report) is a license usage report, which fulfils reporting requirements as specified by the policy. RUM reports are generated by the product instance and consumed by CSSM. The product instance records license usage information and all license usage changes in an open RUM report. At system-determined intervals, open RUM reports are closed and new RUM reports are opened to continue recording license usage. A closed RUM report is ready to be sent to CSSM.

A RUM acknowledgement (RUM ACK or ACK) is a response from CSSM and provides information about the status of a RUM report. Once the ACK for a report is available on the product instance, it indicates that the corresponding RUM report is no longer required and can be deleted.

The reporting method, that is, how a RUM report is sent to CSSM, depends on the topology you implement.

CSSM displays license usage information as per the last received RUM report.

A RUM report may be accompanied by other requests, such as a trust code request, or a SLAC request. So in addition to the RUM report IDs that have been received, an ACK from CSSM may include authorization codes, trust codes, and policy files.

The policy that is applied to a product instance determines the following aspects of the reporting requirement:

- Whether a RUM report is sent to CSSM and the maximum number of days provided to meet this requirement.
- Whether the RUM report requires an acknowledgement (ACK) from CSSM.
- The maximum number of days provided to report a change in license consumption.

RUM report generation, storage, and management

Starting with Cisco IOS XE Cupertino 17.7.1, RUM report generation and related processes have been optimized and enhanced as follows:

- You can display the list of all available RUM reports on a product instance (how many there are, the processing state each one is in, if there are errors in any of them, and so on). This information is available in the **show license rum** , **show license all** , and **show license tech** privileged EXEC commands. For detailed information about the fields displayed in the output, see the command reference of the corresponding release.
- RUM reports are stored in a new format that reduces processing time, and reduces memory usage. In order to ensure that there are no usage reporting inconsistencies resulting from the difference in the old and new formats, we recommend that you send a RUM report in the method that will apply to your topology, in these situations:

  When you upgrade from an earlier release supporting Smart Licensing Using Policy, to Cisco IOS XE Cupertino 17.7.1 or a later release.

  When you downgrade from Cisco IOS XE Cupertino 17.7.1 or a later release to an earlier release supporting Smart Licensing Using Policy.
- To ensure continued disk space and memory availability, the product instance detects and triggers deletion of RUM reports that are deemed eligible.

Trust Code

A *UDI-tied public key*, which the product instance uses to

- Sign a RUM report. This prevents tampering and ensures data authenticity.
- Enable secure communication with CSSM.

There are multiple ways to obtain a trust code.

- From Cisco IOS XE Cupertino 17.7.1, a trust code is factory-installed for all new orders.

Note A factory-installed trust code cannot be used for *communication* with CSSM.

- A trust code can obtained from CSSM, using an ID token.

  Here you generate an *ID token* in the CSSM Web UI to obtain a trust code and install it on the product instance. You must overwrite the factory-installed trust code if there is one. If a product instance is directly connected to CSSM, use this method to enable the product instance to communicate with CSSM in a secure manner. This method of obtaining a trust code is applicable to all the options of directly connecting to CSSM. For more information, see Connected Directly to Cisco SSM, on page 12.

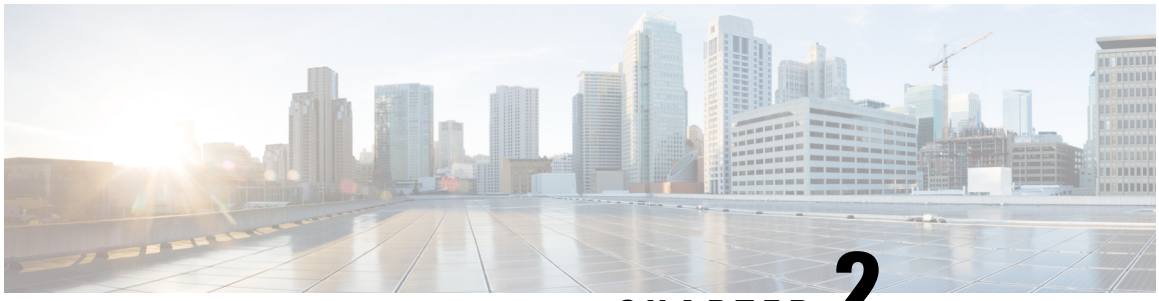
- From Cisco IOS XE Cupertino 17.7.1, a trust code is automatically obtained in topologies where the product instance initiates the sending of data to CSLU and in topologies where the product instance is in an air-gapped network.

  From Cisco IOS XE Cupertino 17.9.1, a trust code is automatically obtained in topologies where CSLU initiates the retrieval of data from the product instance.

  If there is a factory-installed trust code, it is automatically overwritten. A trust code obtained this way can be used for secure communication with CSSM.

  Refer to the corresponding topology description and workflow to know how the trust code is requested and installed in each scenario in Connecting to Cisco SSM, on page 12.

If a trust code is installed on the product instance, the output of the **show license status** command displays a timestamp in the `Trust Code Installed:` field.



CHAPTER 2

How Smart Licensing Using Policy Works

This section lists the components that may be involved in an implementation of Smart Licensing Using Policy, followed by the sequential stages of managing licenses for Cisco Catalyst 9000 Series Switches.

Components Involved

All possible components involved in an implementation of Smart Licensing Using Policy are listed here, along with a brief description of the component's role in the implementation.

Out of all these components, two are necessarily part of any implementation: the product instance and Cisco SSM. The product instance, because it consumes the license and Cisco SSM because it is the central portal for information about Cisco software licenses.

Product Instance

A product instance is a single instance of a Cisco product, identified by a Unique Device Identifier (UDI). A product instance records and reports license usage (RUM reports), and provides alerts and system messages about overdue reports, communication failures, etc. RUM reports and usage data are securely stored in the product instance.

Throughout this document, the term *product instance* refers to all supported physical and virtual product instances - unless noted otherwise. For information about the product instances that are within the scope of this document, see Supported Products, on page 1.

Cisco Smart Software Manager (Cisco SSM)

Cisco SSM is a portal that enables you to manage all your Cisco software licenses from a centralized location. Cisco SSM helps you manage current requirements and review usage trends to plan for future license requirements.

You can access the Cisco SSM Web UI at https://software.cisco.com. Under **Smart Software Manager**, click the **Manage Licenses** link.

The Connecting to Cisco SSM section in this document explains the different ways in which you can connect to Cisco SSM.

Cisco Smart License Utility (CSLU)

CSLU is a Windows-based reporting utility that provides aggregate licensing workflows. This utility performs these key functions:

- Provides options relating to how workflows are triggered. The workflows can be triggered by CSLU or by the product instance.
- Collects usage reports from the product instance and uploads these usage reports to the corresponding Smart Account or Virtual Account – online, or offline, using files. Similarly, the RUM report ACK is collected online, or offline, and sent back to the product instance.
- Sends authorization code requests to Cisco SSM and receives authorization codes from Cisco SSM, if applicable.

CSLU can be integrated into the Smart Licensing Using Policy implementation in several ways. As a Windows application that is a standalone tool connected to or disconnected from Cisco SSM. Alternatively, it can be deployed on a machine (laptop or desktop) running Linux. It can also be embedded by Cisco in a controller such as Cisco Catalyst Center.

Controller

A management application or service that manages multiple product instances. On Cisco Catalyst 9000 Series Switches, Cisco Catalyst Center is the supported controller.

This table provides information about the supported controller, product instances that support the controller, and minimum required software versions on the controller and on the product instance.

Table 4: Support Information for Controller: Cisco DNA Center

Component	Minimum Required Release
Cisco Catalyst Center This is the minimum required Cisco Catalyst Center version that supports Smart Licensing Using Policy. Support continues on all subsequent releases - unless noted otherwise.	Cisco DNA Center Release 2.2.2
Cisco Catalyst 9200 Series Switches Cisco Catalyst 9300 Series Switches Cisco Catalyst 9400 Series Switches Cisco Catalyst 9500 Series Switches Cisco Catalyst 9600 Series Switches	Cisco IOS XE Amsterdam 17.3.2a This is the minimum required software version on the product instance. This means support continues on all subsequent releases - unless noted otherwise.

For more information about Cisco DNA Center, see the support page at: https://www.cisco.com/c/en/us/support/cloud-systems-management/dna-center/series.html.

Cisco Smart Software Manager On-Prem (SSM On-Prem)

SSM On-Prem is a license server that enables license administration from a server inside an organization's premises, instead of having to connect directly to Cisco SSM.

SSM On-Prem is locally connected and acts as a local license authority. It involves setting up an SSM on-prem license server, which synchronizes its license database with Cisco SSM periodically and functions similarly to Cisco SSM.

This table provides information about the minimum required version of SSM On-Prem and the minimum required software version on the supported product instances.

Table 5: Support Information for SSM On-Prem

Component	Minimum Required Release
SSM On-Prem This is the minimum required SSM On-Prem version that supports Smart Licensing Using Policy. Support continues on all subsequent releases - unless noted otherwise.	Version 8, Release 202102
Cisco Catalyst 9200 Series Switches Cisco Catalyst 9300 Series Switches Cisco Catalyst 9400 Series Switches Cisco Catalyst 9500 Series Switches Cisco Catalyst 9600 Series Switches	Cisco IOS XE Amsterdam 17.3.3 This is the minimum required software version on the product instance. This means support continues on all subsequent releases - unless noted otherwise.

For more information, see Cisco Smart Software Manager On-Prem Data Sheet.

Stages of License Management with the Smart Licensing Using Policy Solution

This section describes the sequential order of license management when you deploy and use a Smart Licensing Using Policy solution.

1. Set up a Smart Account and one or more Virtual accounts to structure your Cisco assets (licenses, devices, and general terms). You can view and manage Smart Account and Virtual Accounts in the Cisco SSM portal.
2. Purchase or order licenses through existing channels. Once purchased, assets are available in your organization's Smart Account and Virtual Accounts, and can be accessed through the Cisco SSM portal. Ensuring that the licenses are in the correct Smart Account and Virtual Account is essential to consume your licenses.

   For new hardware or software orders, Cisco simplifies the implementation of Smart Licensing Using Policy by factory-installing custom policies, authorization codes (if applicable), and trust codes.

   For Cisco Catalyst 9000 Series Switches, to know more about available licenses, see Available Licenses.
3. Configure and use the required licenses.

Note Most licenses are unenforced, meaning no preliminary licensing-specific operations are needed before use. Only export-controlled and enforced licenses require Cisco authorization. License usage is recorded with timestamps, allowing required workflows to be completed later.

4. Set up a method to report license usage to Cisco SSM.

   Multiple ways of interfacing with Cisco SSM are available – each way is called a topology. An organization's network requirements and security policy are some of the factors that determine the choice of topology. For each topology, the accompanying overview describes how the set-up is designed to work, and provides considerations and recommendations, if any. To know about all the available topology options, see Connecting to Cisco SSM.

Connecting to Cisco SSM

Multiple ways of interfacing with Cisco SSM are available. An organization's network requirements and security policy are some of the factors that determine the choice of topology.

For each topology, the accompanying overview describes how the set-up is designed to work, and provides considerations and recommendations, if any.

Based on the topology that is selected, refer to the corresponding workflow under Implementing Smart Licensing Using Policy, on page 27, to know how to implement it. These workflows provide the simplest and fastest way to implement a topology. These workflows are meant for new deployments and not for upgrading or migrating from an existing licensing solution.

Connected Directly to Cisco SSM

Overview:

This topology is available in the earlier version of Smart Licensing and continues to be supported with Smart Licensing Using Policy.

Here, you establish a *direct* and *trusted* connection from a product instance to Cisco SSM. The direct connection, requires network reachability to Cisco SSM. For the product instance to then exchange messages and communicate with Cisco SSM, configure one of the transport options available with this topology (described below). Lastly, the establishment of trust requires the generation of a token from the corresponding Smart Account and Virtual Account in Cisco SSM, and installation on the product instance.

Note A factory-installed trust code cannot be used for communication with Cisco SSM. This means that for this topology, you must generate an *ID token* in the Cisco SSM Web UI to obtain a trust code and install it on the product instance. You must overwrite the factory-installed trust code if there is one. Also see Trust Code, on page 6.

You can configure a product instance to communicate with Cisco SSM in the following ways:

- Use Smart transport to communicate with Cisco SSM

Smart transport is a transport method where a Smart Licensing (JSON) message is contained within an HTTPs message, and exchanged between a product instance and Cisco SSM, to communicate. The following Smart transport configuration options are available:

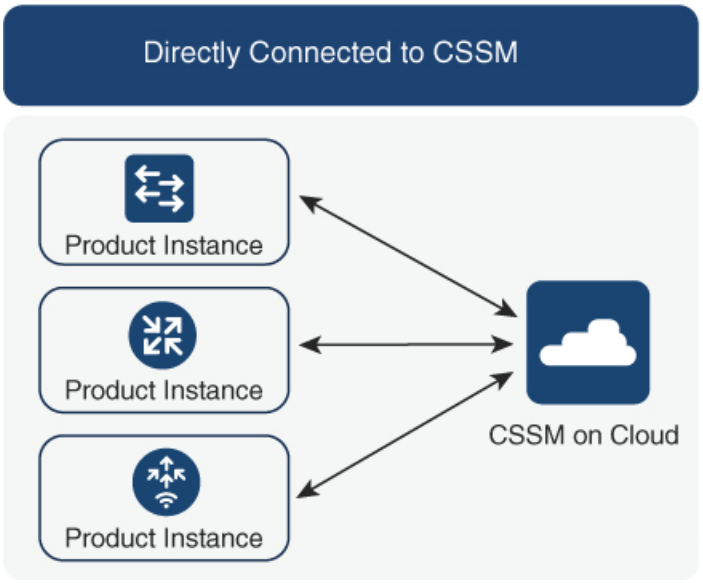
- Smart transport: In this method, a product instance uses a specific Smart transport licensing server URL. This must be configured exactly as shown in the workflow section.
- Smart transport through an HTTPs proxy: In this method, a product instance uses a proxy server to communicate with the licensing server, and eventually, Cisco SSM.

- Use Call Home to communicate with Cisco SSM.

  Call Home provides e-mail-based and web-based notification of critical system events. This method of connecting to Cisco SSM is available in the earlier Smart Licensing environment, and continues to be available with Smart Licensing Using Policy. The following Call Home configuration options are available:

  - Direct cloud access: In this method, a product instance sends usage information directly over the internet to Cisco SSM; no additional components are needed for the connection.
  - Direct cloud access through an HTTPs proxy: In this method, a product instance sends usage information over the internet through a proxy server - either a Call Home Transport Gateway or an off-the-shelf proxy (such as Apache) to Cisco SSM.

Figure 1: Topology: Connected Directly to Cisco SSM



Considerations or Recommendations:

Smart transport is the recommended transport method when directly connecting to Cisco SSM. This recommendation applies to:

- New deployments.
- Earlier licensing models. Change configuration after migration to Smart Licensing Using Policy.

- Registered licenses that currently use the Call Home transport method. Change configuration after migration to Smart Licensing Using Policy.
- Evaluation or expired licenses in an earlier licensing model. Change configuration after migration to Smart Licensing Using Policy.

To change configuration after migration, see Connected Directly to Cisco SSM, on page 12> Product Instance Configuration > Configure a connection method and transport type > Option 1.

Release-Wise Changes and Enhancements:

This section outlines important release-wise software changes and enhancements that affect this topology.

From Cisco IOS XE Cupertino 17.9.1:

- RUM report throttling

  The minimum reporting frequency for this topology, is throttled to one day. This means the product instance does not send more than one RUM report a day. This resolves the problem of too many RUM reports being generated and sent for certain licenses. It also resolves the memory-related issues and system slow-down caused by an excessive generation of RUM reports.

  You can override the throttling restriction by entering the **license smart sync** command in privileged EXEC mode.

  RUM report throttling also applies to the Cisco IOS XE Amsterdam 17.3.6 and later releases of the 17.3.x train, and Cisco IOS XE Bengaluru 17.6.4 and later releases of the 17.6.x train. From 17.9.1, RUM report throttling is applicable to *all* subsequent releases.

Where to Go Next:

To implement this topology, see Connected Directly to Cisco SSM, on page 12.

Connected to Cisco SSM Through CSLU

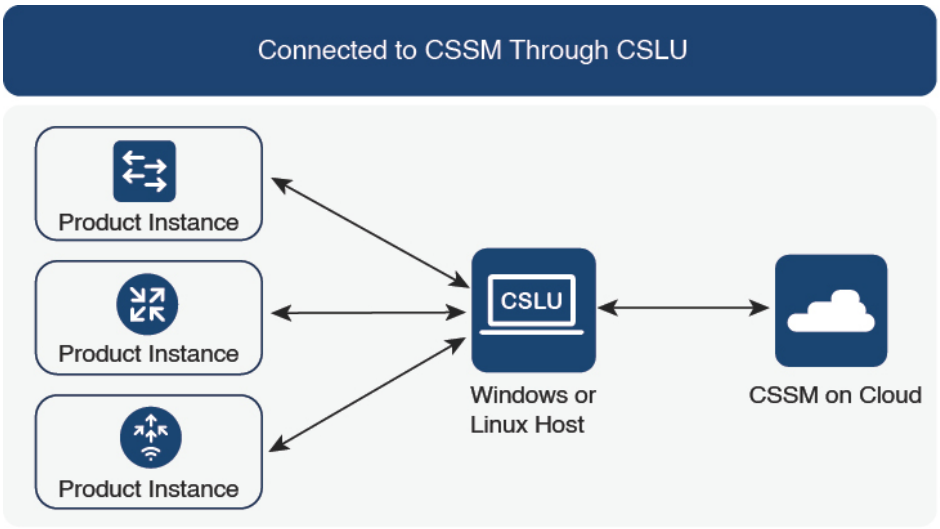
Overview:

Here, product instances in the network are connected to CSLU, and CSLU becomes the single point of interface with Cisco SSM. A product instance can be configured to *push* the required information to CSLU. Alternatively, CSLU can be set-up to *pull* the required information from a product instance at a configurable frequency.

Product instance-initiated communication (push): A product instance initiates communication with CSLU, by connecting to a REST endpoint in CSLU. Data that is sent includes RUM reports and requests for authorization codes, UDI-tied trust codes, and policies. You can configure the product instance to automatically send RUM reports to CSLU at required intervals. This is the default method for a product instance.

CSLU-initiated communication (pull): To initiate the retrieval of information from a product instance, CSLU uses NETCONF, or RESTCONF, or gRPC with YANG models, or native REST APIs, to connect to the product instance. Supported workflows include retrieving RUM reports from the product instance and sending the same to Cisco SSM, authorization code installation, UDI-tied trust code installation, and application of policies.

Figure 2: Topology: Connected to Cisco SSM Through CSLU



Considerations or Recommendations:

Choose the method of communication depending on your network's security policy.

Release-Wise Changes and Enhancements:

This section outlines important release-wise software changes and enhancements that affect this topology.

From Cisco IOS XE Cupertino 17.7.1:

- Trust code request and installation

  If a trust code is not available on the product instance, the product instance detects and automatically includes a request for one, as part of a RUM report. A corresponding ACK from Cisco SSM includes the trust code. If there is an existing factory-installed trust code, it is automatically overwritten. A trust code obtained this way can be used for communication with Cisco SSM.

  This is supported in a standalone, as well as a High Availability set-up. In a High Availability set-up, the active product instance requests the trust code for all connected product instances where a trust code is not available.

  In this release, this enhancement applies only to the product instance-initiated mode.

From Cisco IOS XE Cupertino 17.9.1:

- Trust code request and installation

  From this release, trust code request and installation is supported in the CSLU-initiated mode as well.

- RUM report throttling

  In the product instance-initiated mode, the minimum reporting frequency is throttled to one day. This means the product instance does not send more than one RUM report a day. This resolves the problem of too many RUM reports being generated and sent for certain licenses. It also resolves the memory-related issues and system slow-down caused by an excessive generation of RUM reports.

You can override the throttling restriction by entering the **license smart sync** command in privileged EXEC mode.

RUM report throttling also applies to the Cisco IOS XE Amsterdam 17.3.6 and later releases of the 17.3.x train, and Cisco IOS XE Bengaluru 17.6.4 and later releases of the 17.6.x train. From 17.9.1, RUM report throttling is applicable to *all* subsequent releases.

Where to Go Next:

To implement this topology, see Workflow for Topology: Connected to Cisco SSM Through CSLU, on page 27.

Connected to Cisco SSM Through a Controller

When you use a controller to manage a product instance, the controller connects to Cisco SSM, and is the interface for all communication to and from Cisco SSM. The supported controller for Cisco Catalyst Access, Core, and Aggregation Switches is Cisco DNA Center.

Overview

If a product instance is managed by Cisco DNA Center as the controller, the product instance records license usage and saves the same, but it is the Cisco DNA Center that initiates communication with the product instance to retrieve RUM reports, report to Cisco SSM, and return the ACK for installation on the product instance.

All product instances that must be managed by Cisco DNA Center must be part of its inventory and must be assigned to a site. Cisco DNA Center uses the NETCONF protocol to provision configuration and retrieve the required information from the product instance - the product instance must therefore have NETCONF enabled, to facilitate this.

In order to meet reporting requirements, Cisco DNA Center retrieves the applicable policy from Cisco SSM and provides the following reporting options:

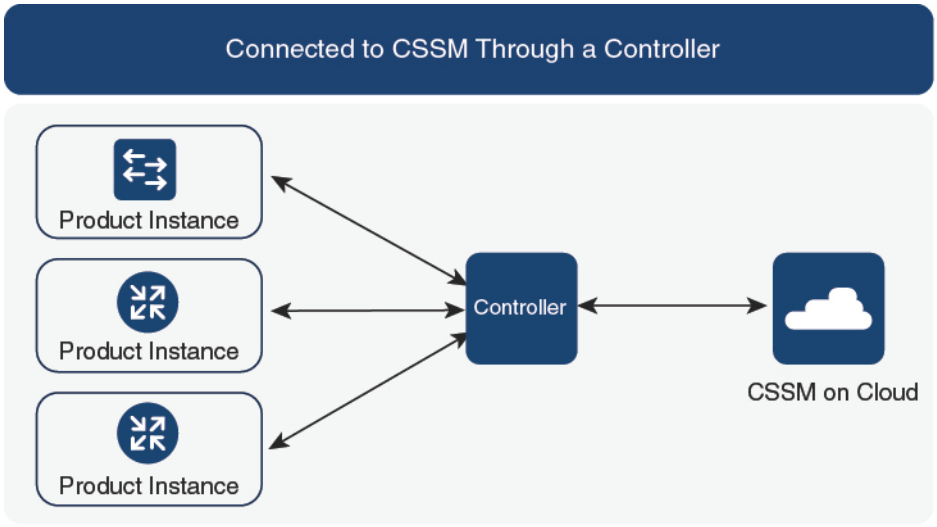
- Ad hoc reporting: You can trigger an ad hoc report when required.
- Scheduled reporting: Corresponds with the reporting frequency specified in the policy and is automatically handled by Cisco DNA Center.

Note Ad hoc reporting must be performed at least once before a product instance is eligible for scheduled reporting.

The first ad hoc report enables Cisco DNA Center to determine the Smart Account and Virtual Account to which subsequent RUM reports must be uploaded. You will receive notifications if ad hoc reporting for a product instance has not been performed even once.

A trust code is *not* required.

Figure 3: Topology: Connected to Cisco SSM Through a Controller



Considerations or Recommendations:

This is the recommended topology if you are using Cisco DNA Center.

Note The HSECK9 key, which is an export-controlled license is supported on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Returning an Authorization Code, on page 115). If you are using a product instance where an HSECK9 key is supported, note that the Cisco DNA Center GUI does not provide an option to generate a SLAC.

Where to Go Next:

To implement this topology, see Workflow for Topology: Connected to Cisco SSM Through a Controller, on page 32.

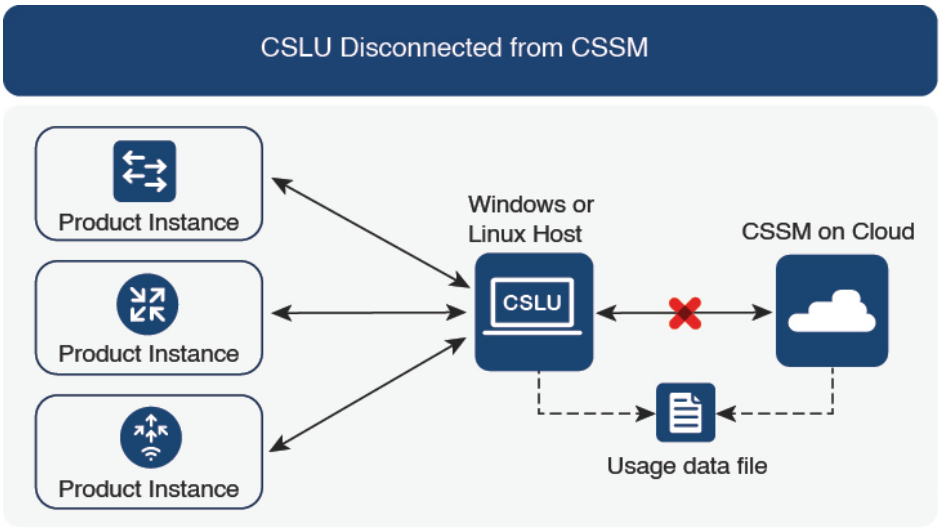
CSLU Disconnected from Cisco SSM

Overview

Here, a product instance communicates with CSLU, and you have the option of implementing product instance-initiated communication or CSLU-initiated communication (as in the *Connected to Cisco SSM Through CSLU* topology). The other side of the communication, between CSLU and Cisco SSM, is offline. CSLU provides you with the option of working in a mode that is disconnected from Cisco SSM.

Communication between CSLU and Cisco SSM is sent and received in the form of signed files that are saved offline and then uploaded to or downloaded from CSLU or Cisco SSM, as the case may be.

Figure 4: Topology: CSLU Disconnected from Cisco SSM



Considerations or Recommendations:

Choose the method of communication depending on your network's security policy.

Release-Wise Changes and Enhancements:

This section outlines important release-wise software changes and enhancements that affect this topology.

From Cisco IOS XE Cupertino 17.7.1:

- Trust code request and installation

  If a trust code is not available on the product instance, the product instance detects and automatically includes a request for one, as part of a RUM report that is sent to CSLU, which you upload to Cisco SSM. The ACK that you download from Cisco SSM includes the trust code. If there is an existing factory-installed trust code, it is automatically overwritten. A trust code obtained this way can be used for communication with Cisco SSM.

  This is supported in a standalone, as well as a High Availability set-up. In a High Availability set-up, the active product instance requests the trust code for members or standbys where a trust code is not available.

  In this release, this enhancement applies only to the product instance-initiated mode.

From Cisco IOS XE Cupertino 17.9.1:

- Trust code request and installation

  From this release, trust code request and installation is supported in the CSLU-initiated mode as well.h

- RUM report throttling

  In the product instance-initiated mode, the minimum reporting frequency is throttled to one day. This means the product instance does not send more than one RUM report a day. This resolves the problem of too many RUM reports being generated and sent for certain licenses. It also resolves the memory-related issues and system slow-down caused by an excessive generation of RUM reports.

You can override the throttling restriction by entering the **license smart sync** command in privileged EXEC mode.

RUM report throttling also applies to the Cisco IOS XE Amsterdam 17.3.6 and later releases of the 17.3.x train, and Cisco IOS XE Bengaluru 17.6.4 and later releases of the 17.6.x train. From 17.9.1, RUM report throttling is applicable to *all* subsequent releases.

Where to Go Next:

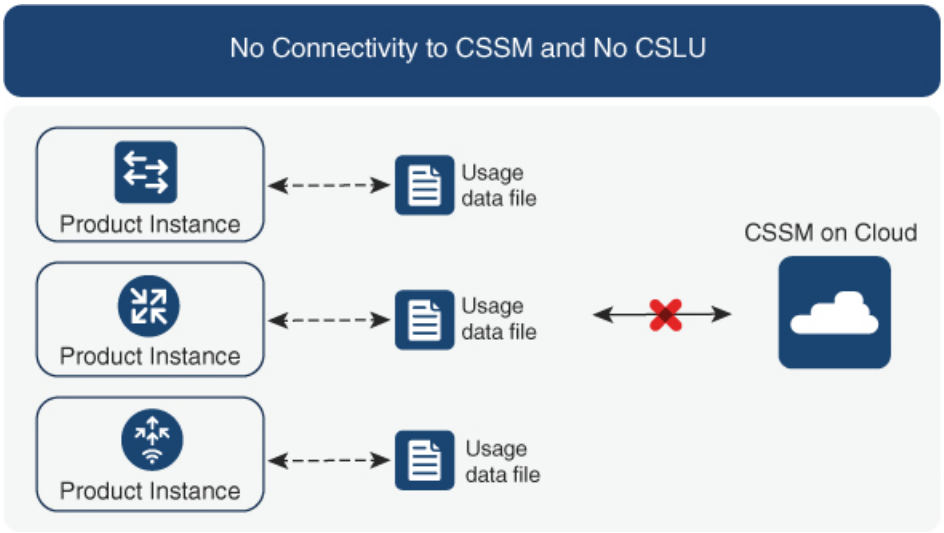
To implement this topology, see Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33.

No Connectivity to Cisco SSM and No CSLU

Overview:

Here you have a product instance and Cisco SSM disconnected from each other, and without any other intermediary utilities or components. All communication is in the form of uploaded and downloaded files. These files can be RUM reports, requests for UDI-tied trust codes and SLAC request or return files.

Figure 5: Topology: No Connectivity to Cisco SSM and No CSLU



Considerations or Recommendations:

This topology is suited to a high-security deployment where a product instance cannot communicate online, with anything outside its network.

Release-Wise Changes and Enhancements:

This section outlines important release-wise software changes and enhancements that affect this topology.

From Cisco IOS XE Cupertino 17.7.1:

- Trust code request and installation

If a trust code is not available on the product instance, the product instance automatically includes a trust code request in the RUM report that you save, to upload to Cisco SSM. The ACK that you then download from Cisco SSM includes the trust code.

If there is a factory-installed trust code, it is automatically overwritten when you install the ACK. A trust code obtained this way can be used for secure communication with Cisco SSM.

This is supported in a standalone, as well as a High Availability set-up. In a High Availability set-up, the active product instance requests the trust code for all connected product instances where a trust code is not available.

- SLAC request and installation

  You can generate a SLAC request and save it in a file on the product instance. The saved file includes all the required details (UDI, license information etc). With this method you do not have to gather and enter the required details on the Cisco SSM Web UI to generate a SLAC. You have to upload the SLAC request file to Cisco SSM and download the file containing the SLAC code and install it on the product instance - as you would a RUM report and ACK.

  Similarly, when you return a SLAC you do not have to locate the product instance in the correct Virtual Account. Simply upload the SLAC return file, as you would a RUM report.

Where to Go Next:

To implement this topology, see Workflow for Topology: No Connectivity to Cisco SSM and No CSLU, on page 37.

SSM On-Prem Deployment

Overview:

SSM On-Prem is designed to work as an extension of Cisco SSM that is deployed on your premises.

Here, a product instance is connected to SSM On-Prem and SSM On-Prem becomes the single point of interface with Cisco SSM. Each instance of SSM On-Prem must be made known to Cisco SSM through a mandatory registration and synchronization of the local account in SSM On-Prem, with a Virtual Account in Cisco SSM.

When you deploy SSM On-Prem to manage a product instance, the product instance can be configured to *push* the required information to SSM On-Prem. Alternatively, SSM On-Prem can be set-up to *pull* the required information from a product instance at a configurable frequency.

- Product instance-initiated communication (push): The product instance initiates communication with SSM On-Prem, by connecting to a REST endpoint in SSM On-Prem. Data that is sent includes RUM reports and requests for authorization codes, trust codes, and policies.

  Options for communication between the product instance and SSM On-Prem in this mode:

  - Use a CLI command to push information to SSM On-Prem as and when required.
  - Use a CLI command and configure a reporting interval, to automatically send RUM reports to SSM On-Prem at a scheduled frequency.

- SSM On-Prem-initiated communication (pull): To initiate the retrieval of information from a product instance, SSM On-Prem NETCONF, RESTCONF, and native REST API options, to connect to the

product instance. Supported workflows include receiving RUM reports from the product instance and sending the same to Cisco SSM, authorization code installation, trust code installation, and application of policies.

Options for communication between the product instance and SSM On-Prem in this mode:

- Collect usage information from one or more product instances as and when required (on-demand).
- Collect usage information from one or more product instances at a scheduled frequency.

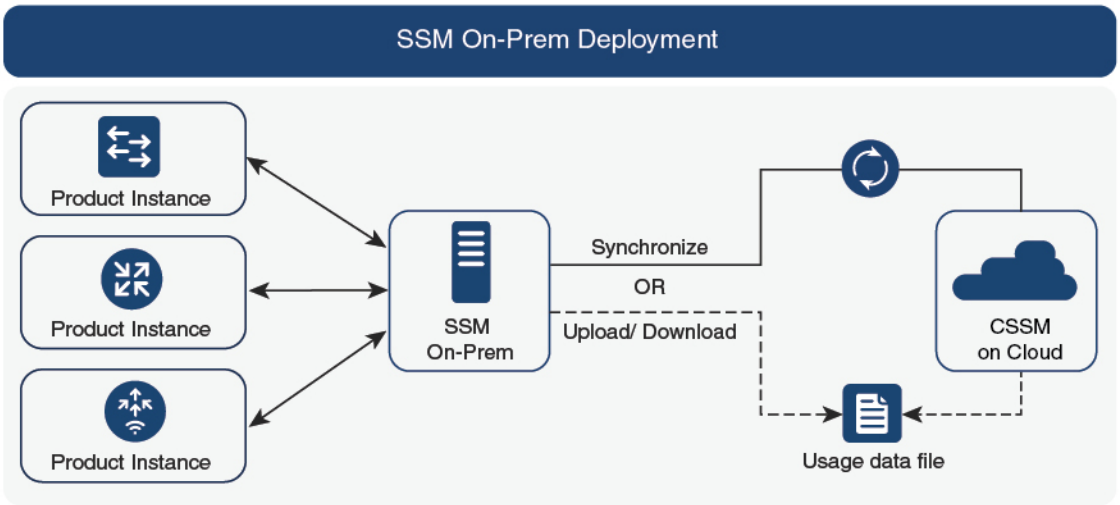
In SSM On-Prem, the reporting interval is set to the default policy on the product instance. You can change this, but only to report more frequently (a narrower interval), or you can install a custom policy if available.

After usage information is available in SSM On-Prem, you must synchronize the same with Cisco SSM, to ensure that the product instance count, license count and license usage information is the same on both, Cisco SSM and SSM On-Prem. Options for usage synchronization between SSM On-Prem and Cisco SSM – for the push *and* pull mode:

- Perform ad-hoc synchronization with Cisco SSM (Synchronize now with Cisco).
- Schedule synchronization with Cisco SSM for specified times.
- Communicate with Cisco SSM through signed files that are saved offline and then upload to or download from SSM On-Prem or Cisco SSM, as the case may be.

Note This topology involves two different kinds of synchronization between SSM On-Prem and Cisco SSM. The first is where the *local account* is synchronized with Cisco SSM - this is for the SSM On-Prem instance to be known to Cisco SSM and is performed by using the **Synchronization** widget in SSM On-Prem. The second is where *license usage* is synchronized with Cisco SSM, either by being connected to Cisco SSM or by downloading and uploading files. You must synchronize the local account before you can synchronize license usage.

Figure 6: Topology: SSM On-Prem Deployment



Considerations or Recommendations:

This topology is suited to the following situations:

- If you want to manage your product instances on your premises, as opposed communicating directly with Cisco SSM for this purpose.
- If your company's policies prevent your product instances from reporting license usage directly to Cisco (Cisco SSM).
- If your product instances are in an air-gapped network and cannot communicate online, with anything outside their network.

Apart from support for Smart Licensing Using Policy, some of the key benefits of SSM On-Prem *Version 8* include:

- Multi-tenancy: One tenant constitutes one Smart Account-Virtual Account pair. SSM On-Prem enables you to manage multiple pairs. Here you create local accounts that reside in SSM On-Prem. Multiple local accounts roll-up to a Smart Account-Virtual Account pair in Cisco SSM. For more information, see the Cisco Smart Software Manager On-Prem User Guide > *About Accounts and Local Virtual Accounts*.

Note The relationship between Cisco SSM and SSM On-Prem instances is still one-to-one.

- Scale: Supports up to a total of 300,000 product instances
- High-Availability: Enables you to run two SSM On-Prem servers in the form of an active-standby cluster. For more information, see the Cisco Smart Software On-Prem Installation Guide > Appendix 4. Managing a High Availability (HA) Cluster in Your System.

  High-Availability deployment is supported in the SSM On-Prem console and the required command details are available in the Cisco Smart Software On-Prem Console Guide.
- Options for online and offline connectivity to Cisco SSM.

SSM On-Prem Limitations:

- Proxy support for communication with Cisco SSM, for the purpose of *license usage* synchronization is available only from Version 8 202108 onwards. The use of a proxy for *local account* synchronization, which is performed by using the **Synchronization** widget, is available from the introductory SSM On-Prem release where Smart Licensing Using Policy is supported.
- SSM On-Prem-initiated communication is not supported on a product instance that is in a Network Address Translation (NAT) set-up. You must use product instance-initiated communication, and further, you must *enable* SSM On-Prem to support a product instance that is in a NAT setup. Details are provided in the workflow for this topology.

Release-Wise Changes and Enhancements:

This section outlines important release-wise software changes and enhancements that affect this topology.

From Cisco IOS XE Cupertino 17.9.1:

- RUM report throttling

In the product instance-initiated mode, the minimum reporting frequency is throttled to one day. This means the product instance does not send more than one RUM report a day. This resolves the problem of too many RUM reports being generated and sent for certain licenses. It also resolves the memory-related issues and system slow-down caused by an excessive generation of RUM reports.

You can override the throttling restriction by entering the **license smart sync** command in privileged EXEC mode.

RUM report throttling also applies to the Cisco IOS XE Amsterdam 17.3.6 and later releases of the 17.3.x train, and Cisco IOS XE Bengaluru 17.6.4 and later releases of the 17.6.x train. From 17.9.1, RUM report throttling is applicable to *all* subsequent releases.

Where to Go Next:

To implement this topology, see Workflow for Topology: SSM On-Prem Deployment, on page 39.

If you are migrating from an existing version of SSM On-Prem, the sequence in which you perform the various upgrade-related activities is crucial. For more information, see *Migrating to a Version of SSM On-Prem That Supports Smart Licensing Using Policy*.

High Availability Considerations

This section explains considerations that apply to a High Availability configuration, when running a software version that supports Smart Licensing Using Policy. The following High Availability setups are within the scope of this document:

A device stack with an active, a standby and one or more members.

A dual-supervisor setup, where two supervisor modules are installed in a chassis, one being the active and the other, the standby.

A dual-chassis setup[2] (could be fixed or modular), with the active in one chassis and a standby in the other chassis.

A dual-chassis *and* dual-supervisor setup[3], on a modular chassis. Two chassis are involved here as well. An active supervisor module is in one chasses and a standby supervisor module in a second chassis. The "dual-supervisor" aspect refers to an additional in-chassis standby supervisor in just one of the chassis, which is the minimum requirement, or an in-chassis standby supervisor in each chassis.

Authorization Code Requirements in a High Availability Setup

The number of SLACs required in a High Availability setup, corresponds with the number of UDIs. Tabled below are the stacking and High Availability setups that are supported when using an export-controlled license (HSECK9 key), and the SLAC requirements in each setup.

Note Each HSECK9 key requires a SLAC. Therefore, the number SLACs will always correspond with the number of HSECK9 keys.

[2] The Cisco StackWise Virtual feature, which is available on certain Cisco Catalyst Access, Core, and Aggregation Switches, is an example of such a setup.
[3] The Quad-Supervisor with Route Processor Redundancy, which is available on certain Cisco Catalyst Access, Core, and Aggregation Switches, is an example of such a setup.

Product Instance Supporting HSECK9 Key	Supported High Availability Setup When Using HSECK9 Key	SLAC Requirements in the Setup
Cisco Catalyst 9300X Series Switches	A device stack with an active, a standby and one or more members.	The SLAC requirement corresponds with the number of UDIs on which you want to configure the cryptographic feature. Each such UDI in the stack requires one SLAC. At a minimum, only the active requires a SLAC. But for uninterrupted use of the cryptographic feature in the event of a switchover, we recommend that you install SLAC on the standby also.
Cisco Catalyst 9500X Series Switches.	None.	Not applicable. High Availability is not supported on Cisco Catalyst 9500X Series Switches.
C9600-LC-40YL4CD line card with supervisor module C9600X-SUP-2	A dual-supervisor setup, where two supervisor modules are installed in a chassis, one being the active and the other, the standby. No other High Availability setup is supported when using an HSECK9 key.	The SLAC requirement corresponds with the number of UDIs. The UDI is tied to the chassis and not the individual supervisor modules. (The UDIs of the active and standby supervisor modules are the same). One SLAC is required for each chassis UDI, regardless of the number of supervisors installed.
Cisco Catalyst 9400 Series Supervisor 2 and 2XL Modules (C9400X-SUP-2 and C9400X-SUP-2XL)	• A dual-supervisor setup, where two supervisor modules are installed in a chassis, one being the active and the other, the standby. • A Cisco StackWise Virtual setup, which involves two chassis. One supervisor module is installed in each chassis, one being the active and the other, the standby.	The SLAC requirement corresponds with the number of UDIs. The UDI is tied to the chassis and not the individual supervisor modules. • In a dual-supervisor setup, one SLAC is required for each chassis UDI, regardless of the number of supervisors installed. • In a Cisco StackWise Virtual setup, at a minimum, you must obtain a SLAC for the chassis with the active supervisor module. But for uninterrupted use of the cryptographic feature in the event of a switchover, we recommend that you obtain an SLAC for the chassis with the standby supervisor module also.

Trust Code Requirements in a High Availability setup

The number of trust codes required depends on the number of UDIs. The active product instance can submit requests for all devices in the High Availability setup and install all the trust codes that are returned in an ACK.

Policy Requirements in a High Availability setup

There are no policy requirements that apply exclusively to a High Availability setup. As in the case of a standalone product instance, only one policy exists in a High Availability setup as well, and this is on the active. The policy on the active applies to the standby or members in the setup.

Product Instance *Functions* in a High Availability setup

This section explains general product instance functions in a High Availability setup, as well as what the product instance does when a new standby or member is added to an existing High Available setup.

For authorization and trust codes: The active product instance can request (if required) and install authorization codes and trust codes for standbys and members.

For policies: The active product instance synchronizes with the standby.

For reporting: Only the active product instance reports usage. The active reports usage information for all devices (standbys or members – as applicable) in the High Availability setup.

In addition to scheduled reporting, the following events trigger reporting:

- The addition or removal of a standby. The RUM report includes information about the standby that was added or removed.
- The addition or removal of a member, including stack merge and stack split events. The RUM report includes information about member that was added or removed.
- A switchover.
- A reload.

When one of the above events occur, the "Next report push" date of the **show license status** privileged EXEC command is updated. But it is the implemented topology and associated reporting method that determine if the report is sent by the product instance or not. For example, if you have implemented a topology where the product instance is disconnected (Transport Type is Off), then the product instance does not send RUM reports even if the "Next report push" date is updated.

For a new member or standby addition:

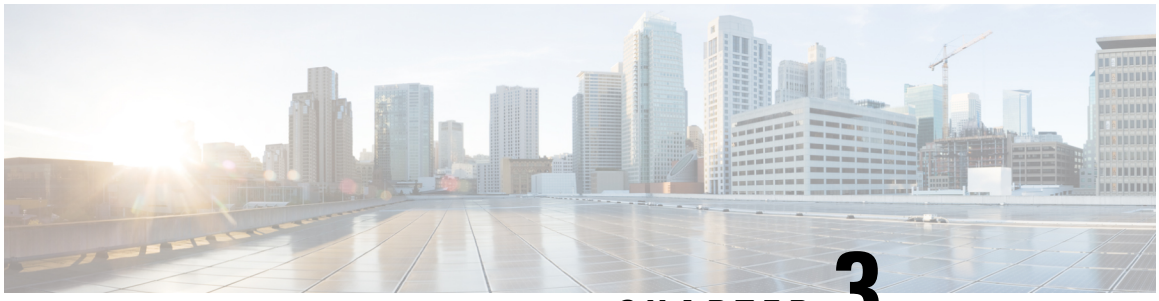
- A product instance that is connected to CSLU, does not take any further action.
- A product instance that is directly connected to CSSM, performs trust synchronization. Trust synchronization involves the following:

  Installation of trust code on the standby or member if not installed already.

  If a trust code is already installed, the trust synchronization process ensures that the new standby or member is in the same Smart Account and Virtual Account as the active. If it is not, the new standby or member is *moved* to the same Smart Account and Virtual Account as the active.

  Installation of an authorization code, policy, and purchase information, if applicable

  Sending of a RUM report with current usage information.



CHAPTER 3

Implementing Smart Licensing Using Policy

This chapter provides the simplest and fastest way to implement Smart Licensing Using Policy for new deployments. If you are migrating from an existing licensing model, see Migrating to Smart Licensing Using Policy.

Workflow for Topology: Connected to Cisco SSM Through CSLU

Depending on whether you want to implement a product instance-initiated or CSLU-initiated method of communication, complete the corresponding sequence of tasks:

- Tasks for Product Instance-Initiated Communication
- Tasks for CSLU-Initiated Communication

Tasks for Product Instance-Initiated Communication

CSLU Installation → CSLU Preference Settings → Product Instance Configuration → Authorization Code Installation (Only if Applicable)

1. ***CSLU Installation***

   Where task is performed: A laptop, destop, or a Virtual Machine (VM) running Windows 10 or Linux.

   Download the file from Smart Software Manager > **Smart Licensing Utility**.

   Refer to Cisco Smart License Utility Quick Start Setup Guide and Cisco Smart Licensing Utility User Guide for help with installation and set-up.

2. ***CSLU Preference Settings***

   Where tasks are performed: CSLU Interface

   a. Logging into Cisco (CSLU Interface), on page 76

b. Configuring a Smart Account and a Virtual Account (CSLU Interface), on page 76

c. Adding a Product-Initiated Product Instance in CSLU (CSLU Interface), on page 30

3. ***Product Instance Configuration***

   Where tasks are performed: Product Instance

   a. Ensuring Network Reachability for Product Instance-Initiated Communication, on page 96

   b. Ensure that transport type is set to **cslu**.

   CSLU is the default transport type. If you have configured a different option, enter the **license smart transport cslu** command in global configuration mode. Save any changes to the configuration file.

```
Device(config)# license smart transport cslu
Device(config)# exit
Device# copy running-config startup-config
```

   c. Specify how you want CSLU to be discovered (*choose one*):

   - Option 1:

     No action required. Name server configured for Zero-touch DNS discovery of `cslu-local`

     Here, if you have configured DNS (The name server IP address is configured on the product instance), and the DNS server has an entry where hostname `cslu-local` is mapped to the CSLU IP address, then no further action is required. The product instance automatically discovers hostname `cslu-local`.

   - Option 2:

     No action required. Name server and domain configured for Zero-touch DNS discovery of `cslu-local.<domain>`

     Here if you have configured DNS, (The name server IP address and domain is configured on the product instance), and the DNS server has an entry where `cslu-local.<domain>` is mapped to the CSLU IP address, then no further action is required. The product instance automatically discovers hostname cslu-local.

   - Option 3:

     Configure a specific URL for CSLU.

     Enter the **license smart url cslu** *http://<cslu_ip_or_host>:8182/cslu/v1/pi* command in global configuration mode. For `<cslu_ip_or_host>`, enter the hostname or the IP address of the windows host where you have installed CSLU. 8182 is the port number and it is the only port number that CSLU uses.

```
Device(config)# license smart url cslu http://192.168.0.1:8182/cslu/v1/pi
Device(config)# exit
Device# copy running-config startup-config
```

4. ***Authorization Code Installation (Only if Applicable)***

   Where tasks is performed: Product Instance

   An export-controlled license is supported only on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Returning an Authorization Code, on page 115). If you want to use an

export-controlled license, complete the following task on supported platforms: Manually Requesting and Auto-Installing a SLAC , on page 107.

Result:

Since the product instance initiates communication, it automatically sends out the first RUM report at the scheduled time, as per the policy. Along with this first report, if applicable, it sends a request for a UDI-tied trust code. CSLU forwards the RUM report to Cisco SSM and retrieves the ACK, which also contains the trust code. The ACK is applied to the product instance the next time the product instance contacts CSLU.

In the product instance-initiated mode, the product instance does not send more than one RUM report a day. You can override this for an on-demand synchronization between the product instance and CSLU, by entering the **license smart sync** command in privileged EXEC mode

To know when the product instance will be sending the next RUM report, enter the **show license all** command in privileged EXEC mode and in the output, check the date in the `Next report push` field.

To verify trust code installation, enter the **show license status** command in privileged EXEC mode. Check for the updated timestamp in the `Trust Code Installed` field.

If you want to change the boot level license, see Configuring a Base or Add-On License , on page 129.

If you want to return an authorization code, see Returning an Authorization Code, on page 115.

Tasks for CSLU-Initiated Communication

CSLU Installation → CSLU Preference Settings→ Product Instance Configuration→ Authorization Code Installation (Only if Applicable) → Usage Synchronization

1. ***CSLU Installation***

   Where task is performed: A laptop, destop, or a Virtual Machine (VM) running Windows 10 or Linux.

   Download the file from Smart Software Manager > **Smart Licensing Utility**.

   Refer to Cisco Smart License Utility Quick Start Setup Guide and Cisco Smart Licensing Utility User Guide for help with installation and set-up.

2. ***CSLU Preference Settings***

   Where tasks are performed: CSLU Interface

   a. Logging into Cisco (CSLU Interface), on page 76

   b. Configuring a Smart Account and a Virtual Account (CSLU Interface), on page 76

   c. Adding a Product-Initiated Product Instance in CSLU (CSLU Interface), on page 30

3. ***Product Instance Configuration***

   Where tasks is performed: Product Instance

   Ensuring Network Reachability for Product Instance-Initiated Communication, on page 96

4. ***Authorization Code Installation (Only if Applicable)***

   Where tasks are performed: CSLU Interface and Cisco SSM Web UI

   An export-controlled license is supported only on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Returning an Authorization Code, on page 115). If you want to use an export-controlled license, complete the following tasks on supported platforms:

a. Manually Requesting and Auto-Installing a SLAC , on page 107

b. Requesting SLAC for One or More Product Instance (CSLU Interface), on page 86

c. Generating and Downloading SLAC from Cisco SSM to a File, on page 113

d. Import from Cisco SSM (CSLU Interface), on page 81

5. ***Usage Synchronization***

   Where tasks is performed: CSLU Interface

Result:

Since CSLU is logged into Cisco SSM, the reports are automatically sent to the associated Smart Account and Virtual Account in Cisco SSM and Cisco SSM will send an ACK to CSLU as well as to the product instance. It gets the ACK from Cisco SSM and sends this back to the product instance for installation. The ACK from Cisco SSM contains the trust code and SLAC if this was requested.

Trust code request and installation is supported starting with Cisco IOS XE Cupertino 17.9.1.

If you want to change the boot level license, see Configuring a Base or Add-On License.

If you want to return an authorization code, see Returning an Authorization Code.

Adding a Product-Initiated Product Instance in CSLU (CSLU Interface)

Complete these steps to add a device-created Product Instance using the Preferences tab.

Step 1 Click the **Preferences** tab.

Step 2 In the Preferences screen, de-select the **Validate Device** check box.

Step 3 Set the **Default Connect Method** to **Product Instance Initiated** and then click **Save**.

Adding a CSLU-Initiated Product Instance in CSLU (CSLU Interface)

Using the CSLU interface, you can configure the connect method to be CSLU Initiated. This connect method (mode) enables CSLU to retrieve product instance information.

Note The default Connect Method is set in the **Preferences** tab.

Complete these steps to add a Product Instance from the Inventory tab

Step 1 Go to the **Inventory** tab and from the Product Instances table, select **Add Single Product**.

Step 2 Enter the **Host** (IP address of the host).

Step 3 Select the **Connect Method** and select an appropriate CSLU Initiated connect method.

Step 4 In the right panel, click **Product Instance Login Credentials**. The left panel of the screen changes to show the User Name and Password fields

Step 5 Enter the product instance **User Name** and **Password**.

Step 6 Click **Save**.

The information is saved to the system and the device is listed in the Product Instances table with the Last Contact listed as never.

Workflow for Topology: Connected Directly to Cisco SSM

Smart Account Set-Up → Product Instance Configuration → Trust Establishment with Cisco SSM→ Authorization Code Installation (Only if Applicable)

1. ***Smart Account Set-Up***

   Where task is performed: Cisco SSM Web UI, https://software.cisco.com/.

   Ensure that you have a user role with proper access rights to a Smart Account and the required Virtual Accounts.

2. ***Product Instance Configuration***

   Where tasks are performed: Product Instance

   a. Set-Up product instance connection to Cisco SSM: Setting Up a Connection to Cisco SSM , on page 86.

   b. Configure a connection method and transport type (choose one)

   - Option 1:

     Smart transport: Set transport type to **smart** and configure the corresponding URL.

     If the transport mode is set to **license smart transport smart**, and you configure **license smart url default**, the Smart URL (https://smartreceiver.cisco.com/licservice/license) is automatically configured. Save any changes to the configuration file.

     ```
     Device(config)# license smart transport smart
     Device(config)# license smart url default
     Device(config)# exit
     Device# copy running-config startup-config
     ```

   - Option 2:

     Configure Smart transport through an HTTPs proxy. See Configuring Smart Transport Through an HTTPs Proxy, on page 89

   - Option 3:

     Configure Call Home service for direct cloud access. See Configuring the Call Home Service for Direct Cloud Access, on page 90.

   - Option 4:

     Configure Call Home service for direct cloud access through an HTTPs proxy. See Configuring the Call Home Service for Direct Cloud Access through an HTTPs Proxy Server, on page 93.

3. ***Trust Establishment with Cisco SSM***

Where task is performed: Cisco SSM Web UI and then the product instance

a. Generate one token for each *Virtual Account* you have. You can use same token for all the product instances that are part of one Virtual Account: Generating a New Token for a Trust Code from CSSM, on page 121.

b. Having downloaded the token, you can now install the trust code on the product instance: Establishing Trust with an ID Token, on page 122.

4. ***Authorization Code Installation (Only if Applicable)***

   Where tasks are performed: Product Instance

   An export-controlled license is supported only on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Returning an Authorization Code, on page 115). If you want to use an export-controlled license, complete the following task on supported platforms: Manually Requesting and Auto-Installing a SLAC , on page 107.

Result:

After establishing trust, Cisco SSM returns a policy. The policy is automatically installed on all product instances of that Virtual Account. The policy specifies if and how often the product instance reports usage.

The following applies only to Cisco IOS XE Amsterdam 17.3.6 and later releases of the 17.3.x train and Cisco IOS XE Bengaluru 17.6.4 and later releases of the 17.6.x train: the product instance does not send more than one RUM report a day. You can override this for an on-demand synchronization between the product instance and CSLU, by entering the **license smart sync** command in privileged EXEC mode.

If you want to change your reporting interval to report more frequently: on the product instance, configure the **license smart usage interval** command in global configuration mode. For syntax details see the *license smart (privileged EXEC)* command in the Command Reference for the corresponding release.

If you want to change the boot level license, see Configuring a Base or Add-On License , on page 129.

If you want to return an authorization code, see Returning an Authorization Code, on page 115.

Workflow for Topology: Connected to Cisco SSM Through a Controller

To deploy Cisco DNA Center as the controller, complete the following workflow:

Product Instance Configuration → Cisco DNA Center Configuration

1. ***Product Instance Configuration***

   Where task is performed: Product Instance

   Enable NETCONF. Cisco DNA Center uses the NETCONF protocol to provision configuration and retrieve the required information from the product instance - the product instance must therefore have NETCONF enabled, to facilitate this.

   For more information, see the Programmability Configuration Guide, Cisco IOS XE Amsterdam 17.3.x. In the guide, go to *Model-Driven Programmability > NETCONF Protocol*.

2. ***Cisco DNA Center Configuration***

Where tasks is performed: Cisco DNA Center GUI

An outline of the tasks you must complete and the accompanying documentation reference is provided below. The document provides detailed steps you have to complete in the Cisco DNA Center GUI:

a. Set-up the Smart Account and Virtual Account.

Enter the same log in credentials that you use to log in to the Cisco SSM Web UI. This enables Cisco DNA Center to establish a connection with Cisco SSM.

See the *Cisco DNA Center Administrator Guide* of the required release (Release 2.2.2 onwards) > *Manage Licenses* > *Set Up License Manager*.

b. Add the required product instances to Cisco DNA Center inventory and assign them to a site.

This enables Cisco DNA Center to push any necessary configuration, including the required certificates, for Smart Licensing Using Policy to work as expected.

See the *Cisco DNA Center User Guide* of the required release (Release 2.2.2 onwards) > *Display Your Network Topology* > *Assign Devices to a Site*.

Result:

After you implement the topology, *you* must trigger the very first ad hoc report in Cisco DNA Center, to establish a mapping between the Smart Account and Virtual Account, and product instance. See the *Cisco DNA Center Administrator Guide* of the required release (Release 2.2.2 onwards) > *Manage Licenses* > *Upload Resource Utilization Details to Cisco SSM*. Once this is done, Cisco DNA Center handles subsequent reporting based on the reporting policy.

If multiple policies are available, Cisco DNA Center maintains the narrowest reporting interval. You can change this, but only to report more frequently (a narrower interval). See the *Cisco DNA Center Administrator Guide* of the required release (Release 2.2.2 onwards) > *Manage Licenses* > *Modify License Policy*.

If you want to change the license level after this, see the *Cisco DNA Center Administrator Guide* of the required release (Release 2.2.2 onwards) > *Manage Licenses* > *Change License Level*.

Workflow for Topology: CSLU Disconnected from Cisco SSM

Depending on whether you want to implement a product instance-initiated or CSLU-initiated method of communication. Complete the corresponding table of tasks below.

- Tasks for Product Instance-Initiated Communication, on page 33
- Tasks for CSLU-Initiated Communication

Tasks for Product Instance-Initiated Communication

CSLU Installation → CSLU Preference Settings → Product Instance Configuration→ Authorization Code Installation (Only if Applicable)→ Usage Synchronization

1. ***CSLU Installation***

   Where task is performed: A Windows host (laptop, destop, or a Virtual Machine (VM)

   Download the file from Smart Software Manager > **Smart Licensing Utility**.

   Refer to the Cisco Smart License Utility Quick Start Setup Guide for help with installation and set-up.

2. ***CSLU Preference Settings***

   Where tasks are performed: CSLU interface

   a. In the CSLU Preferences tab, click the **Cisco Connectivity** toggle switch to **off**. The field switches to "Cisco Is Not Available".

   b. Configuring a Smart Account and a Virtual Account (CSLU Interface), on page 76

   c. Adding a Product-Initiated Product Instance in CSLU (CSLU Interface), on page 30

3. ***Product Instance Configuration***

   Where tasks are performed: Product Instance

   a. Ensuring Network Reachability for Product Instance-Initiated Communication, on page 96

   b. Ensure that transport type is set to **cslu**.

      CSLU is the default transport type. If you have configured a different option, enter the **license smart transport cslu** command in global configuration mode. Save any changes to the configuration file.

      ```
      Device(config)# license smart transport cslu
      Device(config)# exit
      Device# copy running-config startup-config
      ```

   c. Specify how you want CSLU to be discovered (*choose one*)

      - Option 1:

        No action required. Name server configured for Zero-touch DNS discovery of `cslu-local`

        Here, if you have configured DNS (The name server IP address is configured on the product instance), and the DNS server has an entry where hostname `cslu-local` is mapped to the CSLU IP address, then no further action is required. The product instance automatically discovers hostname `cslu-local`.

      - Option 2:

        No action required. Name server and domain configured for Zero-touch DNS discovery of `cslu-local.<domain>`

        Here if you have configured DNS, (The name server IP address and domain is configured on the product instance), and the DNS server has an entry where `cslu-local.<domain>` is mapped to the CSLU IP address, then no further action is required. The product instance automatically discovers hostname cslu-local.

      - Option 3:

        Configure a specific URL for CSLU.

        Enter the **license smart url cslu** *http://<cslu_ip_or_host>:8182/cslu/v1/pi* command in global configuration mode. For `<cslu_ip_or_host>`, enter the hostname or the IP address of the windows host where you have installed CSLU. 8182 is the port number and it is the only port number that CSLU uses.

        ```
        Device(config)# license smart url cslu http://192.168.0.1:8182/cslu/v1/pi
        Device(config)# exit
        Device# copy running-config startup-config
        ```

4. ***Authorization Code Installation (Only if Applicable)***

Where tasks are performed: Product Instance and Cisco SSM Web UI

An export-controlled license is supported only on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Authorization Code, on page 3). If you want to use an export-controlled license, complete the following tasks on supported platforms:

a. Manually Requesting and Auto-Installing a SLAC , on page 107

b. Requesting SLAC for One or More Product Instance (CSLU Interface), on page 86

c. Generating and Downloading SLAC from Cisco SSM to a File, on page 113

d. Import from Cisco SSM (CSLU Interface), on page 81

5. ***Usage Synchronization***

   Where tasks are performed: CSLU and Cisco SSM

   Since the product instance initiates communication, it automatically sends out the first RUM report at the scheduled time, as per the policy. You can also enter the **license smart sync** privileged EXEC command to trigger this. Along with this first report, if applicable, it sends a request for a UDI-tied trust code. Since CSLU is disconnected from Cisco SSM, perform the following tasks to send the RUM Reports to Cisco SSM.

   a. Export to Cisco SSM (CSLU Interface), on page 80

   b. Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124

   c. Import from Cisco SSM (CSLU Interface), on page 81

Result:

The ACK you have imported from Cisco SSM contains the trust code if this was requested. The ACK is applied to the product instance the next time the product instance contacts CSLU.

The following applies only to Cisco IOS XE Amsterdam 17.3.6 and later releases of the 17.3.x train and Cisco IOS XE Bengaluru 17.6.4 and later releases of the 17.6.x train: in the product instance-initiated mode, the product instance does not send more than one RUM report a day. You can override this for an on-demand synchronization between the product instance and CSLU, by entering the **license smart sync** command in privileged EXEC mode.

To know when the product instance will be sending the next RUM report, enter the **show license all** command in privileged EXEC mode and in the output, check the date for the `Next report push` field.

If you want to change the boot level license, see Configuring a Base or Add-On License , on page 129.

If you want to return an authorization code, see Returning an Authorization Code, on page 115.

Tasks for CSLU-Initiated Communication

CSLU Installation → CSLU Preference Settings → Product Instance Configuration → Authorization Code Installation (Only if Applicable) → Usage Synchronization

1. ***CSLU Installation***

   Where task is performed: A Windows host (laptop, destop, or a Virtual Machine (VM)

   Download the file from Smart Software Manager > **Smart Licensing Utility**.

Refer to the Cisco Smart License Utility Quick Start Setup Guide for help with installation and set-up.

2. ***CSLU Preference Settings***

   Where tasks is performed: CSLU

   a. In the CSLU Preferences tab, click the **Cisco Connectivity** toggle switch to **off**. The field switches to "Cisco Is Not Available".

   b. Configuring a Smart Account and a Virtual Account (CSLU Interface), on page 76

   c. Adding a CSLU-Initiated Product Instance in CSLU (CSLU Interface), on page 30

   d. Collecting Usage Reports: CSLU Initiated (CSLU Interface), on page 79

3. ***Product Instance Configuration***

   Where task is performed: Product Instance

   Ensuring Network Reachability for CSLU-Initiated Communication, on page 81

4. ***Authorization Code Installation (Only if Applicable)***

   Where tasks are performed: Product Instance

   An export-controlled license is supported only on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Returning an Authorization Code, on page 115). If you want to use an export-controlled license, complete the following tasks on supported platforms:

   a. Manually Requesting and Auto-Installing a SLAC , on page 107

   b. Requesting SLAC for One or More Product Instance (CSLU Interface), on page 86

   c. Generating and Downloading SLAC from Cisco SSM to a File, on page 113

   d. Import from Cisco SSM (CSLU Interface), on page 81

5. ***Usage Synchronization***

   Where tasks are performed: CSLU and Cisco SSM

   Collect usage data from the product instance. Since CSLU is disconnected from Cisco SSM, you then save usage data which CSLU has collected from the product instance to a file. Then, from a workstation that is connected to Cisco, upload it to Cisco SSM. After this, download the ACK from Cisco SSM. In the workstation where CSLU is installed and connected to the product instance, upload the file to CSLU.

   a. Export to Cisco SSM (CSLU Interface), on page 80

   b. Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124

   c. Import from Cisco SSM (CSLU Interface), on page 81

Result:

The uploaded ACK is applied to the product instance the next time CSLU runs an update.

If you want to change the boot level license, see Configuring a Base or Add-On License , on page 129.

If you want to return an authorization code, see Returning an Authorization Code, on page 115.

Adding a Product-Initiated Product Instance in CSLU (CSLU Interface)

Complete these steps to add a device-created Product Instance using the Preferences tab.

Step 1 Click the **Preferences** tab.

Step 2 In the Preferences screen, de-select the **Validate Device** check box.

Step 3 Set the **Default Connect Method** to **Product Instance Initiated** and then click **Save**.

Adding a CSLU-Initiated Product Instance in CSLU (CSLU Interface)

Using the CSLU interface, you can configure the connect method to be CSLU Initiated. This connect method (mode) enables CSLU to retrieve product instance information.

Note The default Connect Method is set in the **Preferences** tab.

Complete these steps to add a Product Instance from the Inventory tab

Step 1 Go to the **Inventory** tab and from the Product Instances table, select **Add Single Product**.

Step 2 Enter the **Host** (IP address of the host).

Step 3 Select the **Connect Method** and select an appropriate CSLU Initiated connect method.

Step 4 In the right panel, click **Product Instance Login Credentials**. The left panel of the screen changes to show the User Name and Password fields

Step 5 Enter the product instance **User Name** and **Password**.

Step 6 Click **Save**.

The information is saved to the system and the device is listed in the Product Instances table with the Last Contact listed as never.

Workflow for Topology: No Connectivity to Cisco SSM and No CSLU

Since you do not have to configure connectivity to any other component, the list of tasks required to set-up the topology is a small one. See, the ***Results*** section at the end of the workflow to know how you can complete requisite usage reporting after you have implemented this topology.

Product Instance Configuration → Authorization Code Installation (Only if Applicable)

1. ***Product Instance Configuration***

   Where task is performed: Product Instance

Set transport type to **off**.

Enter the **license smart transport off** command in global configuration mode. Save any changes to the configuration file.

```
Device(config)# license smart transport off
Device(config)# exit
Device# copy running-config startup-config
```

2. ***Authorization Code Installation (Only if Applicable)***

   Where task is performed: Cisco SSM Web UI and Product Instance

   An export-controlled license is supported only on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Returning an Authorization Code, on page 115). If you want to use an export-controlled license, choose one of the options to install SLAC:

   - Option 1:

     Generate and save the SLAC request to a file, upload it to the Cisco SSM Web UI, download the SLAC code from the Cisco SSM Web UI, and install it on the product instance.

   Note This option is supported starting with Cisco IOS XE Cupertino 17.7.1 only.

     a. Generating and Saving a SLAC Request on the Product Instance, on page 111

     b. Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124

     c. Installing a File on the Product Instance, on page 125.

   - Option 2:

     Generate and download a SLAC in the Cisco SSM Web UI and install it on the prodoct instance. Here you have to enter the product instance information in the Cisco SSM Web UI to generate SLAC:

     a. Generating and Downloading SLAC from Cisco SSM to a File, on page 113.

     b. Installing a File on the Product Instance, on page 125.

Result:

All communication to and from the product instance is disabled. To report license usage you must save RUM reports to a file (on your product instance) and upload it to Cisco SSM (from a workstation that has connectivity to the internet, and Cisco):

1. Generate and save RUM reports

   Enter the **license smart save usage** command in provileged EXEC mode. In the example below, all RUM reports are saved to the flash memory of the product instance, in file `all_rum.txt`.

   Starting with Cisco IOS XE Cupertino 17.7.1, configuring this command automatically includes a trust code request in the RUM report - if a trust code does not already exist on the product instance.

   ```
   Device# license smart save usage all file bootflash:all_rum.txt
   Device# copy bootflash:all_rum.txt tftp://10.8.0.6/user01
   ```

2. Upload usage data to Cisco SSM: Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124

3. Install the ACK on the product instance: Installing a File on the Product Instance, on page 125

If you want to change the boot level license, see Configuring a Base or Add-On License , on page 129.

If you want to return an authorization code, see Returning an Authorization Code, on page 115.

Workflow for Topology: SSM On-Prem Deployment

Depending on whether you want to implement a product instance-initiated method of communicatio (push) or SSM On-Prem-initiated method of communication (pull), complete the corresponding sequence of tasks:

Tasks for Product Instance-Initiated Communication

SSM On-Prem Installation → Addition and Validation of Product Instances (Only if Applicable) → Product Instance Configuration→ Initial Usage Synchronization

Step 1 SSM On-Prem Installation

Where task is performed: A physical server such as a Cisco UCS C220 M3 Rack Server, or a hardware-based server that meets the necessary requirements.

Download the file from Smart Software Manager > **Smart Software Manager On-Prem**.

Refer to the *Cisco Smart Software On-Prem Installation Guide* and the *Cisco Smart Software On-Prem User Guide* for help with installation.

Installation is complete when you have deployed SSM On-Prem, configured a common name on SSM On-Prem (**Security Widget** > **Certificates**), synchronized the NTP server (**Settings** widget > **Time Settings**), and created, registered, and synchronized (**Synchronization** widget) the SSM On-Prem local account with your Smart Account and Virtual Account in Cisco SSM.

Note Licensing functions in the **On-Prem Licensing Workspace** are greyed-out until you complete the creation, registration, and synchronization of the local account with your Smart Account in Cisco SSM. The *local account* synchronization with Cisco SSM is for the SSM On-Prem instance to be known to Cisco SSM, and is different from usage synchronization which is performed in **4. Initial Usage Synchronization** below.

Step 2 Addition and Validation of Product Instances

Where tasks are performed: SSM On-Prem UI

This step ensures that the product instances are validated and mapped to the applicable Smart Account and Virtual account in Cisco SSM. This step is required only in the following cases:

- If you want your product instances to be added and validated in SSM On-Prem before they are reported in Cisco SSM (for added security).
- If you want to use a license that requires authorization before use (enforcement type: enforced or export-controlled). Such a product instance must be added to SSM On-Prem before you can request the necessary SLAC in Step 3 d below.
- If you have created local virtual accounts (in addition to the default local virtual account) in SSM On-Prem. In this case you must provide SSM On-Prem with the Smart Account and Virtual Account information for the product

instances in these local virtual accounts, so that SSM On-Prem can report usage to the correct license pool in Cisco SSM.

a) Assigning a Smart Account and Virtual Account (SSM On-Prem UI), on page 94
b) Validating Devices (SSM On-Prem UI), on page 95

Note If your product instance is in a NAT set-up, also enable support for a NAT Setup when you enable device validation – both toggle switches are in the same window.

Step 3 Product Instance Configuration

Where tasks are performed: Product Instance and the SSM On-Prem UI

Remember to save any configuration changes on the product instance, by entering the **copy running-config startup-config** command in privileged EXEC mode.

a) Ensuring Network Reachability for Product Instance-Initiated Communication, on page 96
b) Retrieving the Transport URL (SSM On-Prem UI)
c) Setting the Transport Type, URL, and Reporting Interval

The transport type configuration for CSLU and SSM On-Prem are the same (**license smart transport cslu** command in global configuration mode), but the URLs are different.

d) An export-controlled license is supported only on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Returning an Authorization Code, on page 115). Complete these sub-steps only if you want to use an export-controlled license on supported platforms: Submitting an Authorization Code Request (SSM On-Prem UI) and Manually Requesting and Auto-Installing a SLAC

Step 4 ***Initial Usage Synchronization***

Where tasks are performed: Product instance, SSM On-Prem UI, Cisco SSM.

a) Synchronize the product instance with SSM On-Prem.

On the product instance, enter the **license smart sync** {**all** | **local**} command, in privileged EXEC mode. This synchronizes the product instance with SSM On-Prem, to send and receive any pending data.

```
Device(config)# license smart sync local
```

You can verify this in the SSM On-Prem UI. Log in and select the **Smart Licensing** workspace. Navigate to the **Inventory** > **SL Using Policy** tab. In the **Alerts** column of the corresponding product instance, the following message is displayed: Usage report from product instance.

Note If you have not performed Step 2 above (Addition and Validation of Product Instances), completing this sub-step will add the product instance to the SSM On-Prem database.

b) Synchronize usage information with Cisco SSM (*choose one*):

- Option 1:

  SSM On-Prem is connected to Cisco SSM: In the SSM On-Prem UI, Smart Licensing workspace, nagivate to **Reports** > **Usage Schedules** > **Synchronize now with Cisco**.

- Option 2:

SSM On-Prem is not connected to Cisco SSM: See Exporting and Importing Usage Data (SSM On-Prem UI).

You have completed initial usage synchronization. Product instance and license usage information is now displayed in SSM On-Prem.

For subsequent reporting, you have the following options:

- To synchronize data between the product instance and SSM On-Prem:

  Schedule periodic synchronization between the product instance and the SSM On-Prem, by configuring the reporting interval. Enter the **license smart usage interval** interval_in_days command in global configuration mode.

  The following applies only to Cisco IOS XE Amsterdam 17.3.6 and later releases of the 17.3.x train and Cisco IOS XE Bengaluru 17.6.4 and later releases of the 17.6.x train: in the product instance-initiated mode, the product instance does not send more than one RUM report a day. You can override this for an on-demand synchronization between the product instance and CSLU, by entering the **license smart sync** command in privileged EXEC mode.

  To know when the product instance will be sending the next RUM report, enter the **show license all** command in privileged EXEC mode and in the output, check the `Next report push:` field.

- To synchronize usage information with Cisco SSM:
  - Schedule periodic synchronization with Cisco SSM. In the SSM On-Prem UI, navigate to **Reports** > **Usage Schedules** > **Synchronization schedule with Cisco**. Enter the following frequency information and save:
    - **Days**: Refers to how *often* synchronization occurs. For example, if you enter 2, synchronization occurs once every two days.
    - **Time of Day:**: Refers to the time at which synchronization occurs, in the 24-hour notation system. For example, if you enter 14 hours and 0 minutes, synchronization occurs at 2 p.m. (1400) in your local time zone.
  - Upload and download the required files for reporting: Exporting and Importing Usage Data (SSM On-Prem UI)).

If you want to change the boot level license, see Configuring a Base or Add-On License.

If you want to return an authorization code, see Returning an Authorization Code.

Tasks for SSM On-Prem Instance-Initiated Communication

SSM On-Prem Installation → Product Instance Addition → Product Instance Configuration→ Initial Usage Synchronization

Before you begin

Step 1 ***SSM On-Prem Installation***

Where task is performed: A physical server such as a Cisco UCS C220 M3 Rack Server, or a hardware-based server that meets the necessary requirements.

Download the file from Smart Software Manager > **Smart Software Manager On-Prem**.

Refer to the *Cisco Smart Software On-Prem Installation Guide* and the *Cisco Smart Software On-Prem User Guide* for help with installation.

Installation is complete when you have deployed SSM On-Prem, configured a common name on SSM On-Prem (**Security Widget** > **Certificates**), synchronized the NTP server (**Settings** widget > **Time Settings**), and created, registered, and synchronized (**Synchronization** widget) the SSM On-Prem local account with your Smart Account and Virtual Account in Cisco SSM.

Note Licensing functions in the **On-Prem Licensing Workspace** are greyed-out until you complete the creation, registration, and synchronization of the local account with your Smart Account in Cisco SSM. The *local account* synchronization with Cisco SSM is for the SSM On-Prem instance to be known to Cisco SSM, and is different from usage synchronization which is performed in **4. Initial Usage Synchronization** below.

Step 2 ***Product Instance Addition***

Where task is performed: SSM On-Prem UI

Depending on whether you want to add a single product instance or multiple product instances, follow the corresponding sub-steps: Adding One or More Product Instances (SSM On-Prem UI).

Step 3 ***Product Instance Configuration***

Where tasks are performed: Product Instance

Remember to save any configuration changes on the product instance, by entering the **copy running-config startup-config** command in privileged EXEC mode.

a) Ensuring Network Reachability for SSM On-Prem-Initiated Communication

b) An export-controlled license is supported only on certain models of the Cisco Catalyst Access, Core, and Aggregation Switches (See Returning an Authorization Code, on page 115). Complete these sub-steps only if you want to use an export-controlled license on supported platforms: Submitting an Authorization Code Request (SSM On-Prem UI).

The uploaded codes are applied to the product instances the next time SSM On-Prem runs an update. An initial usage synchronization with the product instance is being performed in Step 4 below so this will be completed then.

Step 4 ***Initial Usage Synchronization***

Where tasks are performed: SSM On-Prem, and Cisco SSM.

a) Retrieve usage information from the product instance.

In the SSM On-Prem UI, navigate to **Reports** > **Synchronisation pull schedule with the devices** > **Synchronise now with the device**.

In the **Alerts** column, the following message is displayed: Usage report from product instance.

Tip It takes 60 seconds before synchronization is triggered. To view progress, navigate to the **On-Prem Admin Workspace**, and click the **Support Centre** widget. The system logs here display progress.

b) Synchronize usage information with Cisco SSM (*choose one*)

- Option 1:

SSM On-Prem is connected to Cisco SSM: In the SSM On-Prem UI, Smart Licensing workspace, nagivate to **Reports** > **Usage Schedules** > **Synchronize now with Cisco**.

- Option 2:

  SSM On-Prem is not connected to Cisco SSM. See: Exporting and Importing Usage Data (SSM On-Prem UI).

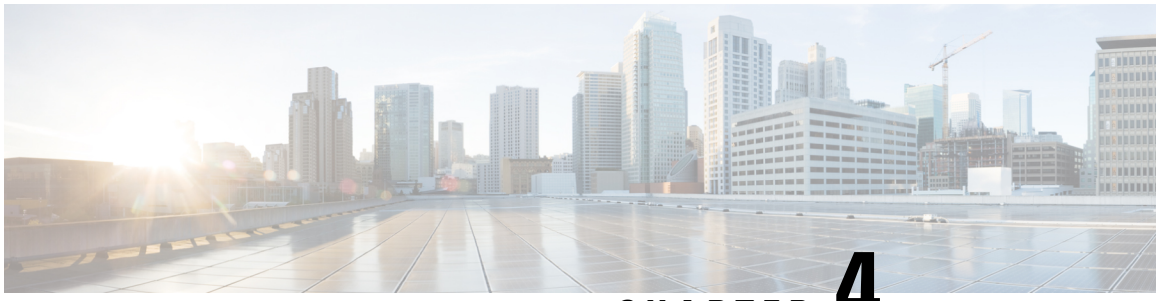
You have completed initial usage synchronization. Product instance and license usage information is now displayed in SSM On-Prem. SSM On-Prem automatically sends the ACK back to the product instance. To verify that the product instance has received the ACK, enter the **show license status** command in privileged EXEC mode, and in the output, check the date for the `Last ACK received` field.

For subsequent reporting, you have the following options:

- To retrieve usage information from the product instance, you can:
  - In the SSM On-Prem UI, Smart Licensing workspace, nagivate to **Reports** > **Usage Schedules** > **Synchronize now with Cisco**.
  - Schedule periodic retrieval of information from the product instance by configuring a frequency. In the SSM On-Prem UI, Smart Licensing workspace, nagivate to **Reports** > **Usage Schedules** > **Synchronisation pull schedule with the devices**. Enter values in the following fields:
    - **Days**: Refers to how *often* synchronization occurs. For example, if you enter 2, synchronization occurs once every two days.
    - **Time of Day:**: Refers to the time at which synchronization occurs, in the 24-hour notation system. For example, if you enter 14 hours and 0 minutes, synchronization occurs at 2 p.m. (1400).
  - Collect usage data from the product instance without being connected to Cisco SSM. In the SSM On-Prem UI, Smart Licensing workspace, nagivate to **Inventory** > **SL Using Policy** tab. Select one or more product instances by enabling the coresponding check box. Click **Actions for Selected...** > **Collect Usage**. On-Prem connects to the selected Product Instance(s) and collects the usage reports. These usage reports are then stored in On-Prem's local library. These reports can then be transferred to Cisco if On-Prem is connected to Cisco, or (if you are not connected to Cisco) you can manually trigger usage collection by selecting **Export/Import All..** > **Export Usage to Cisco**.
- To synchronize usage information with Cisco SSM, you can:
  - Schedule periodic synchronization with Cisco SSM. In the SSM On-Prem UI, navigate to **Reports** > **Usage Schedules** > **Synchronization schedule with Cisco**. Enter the following frequency information and save:
    - **Days**: Refers to how *often* synchronization occurs. For example, if you enter 2, synchronization occurs once every two days.
    - **Time of Day:**: Refers to the time at which synchronization occurs, in the 24-hour notation system. For example, if you enter 14 hours and 0 minutes, synchronization occurs at 2 p.m. (1400).
  - Upload and download the required files for reporting: Exporting and Importing Usage Data (SSM On-Prem UI)).

If you want to change the boot level license, see Configuring a Base or Add-On License , on page 129.

If you want to return an authorization code, see Returning an Authorization Code, on page 115.



CHAPTER 4

Migrating to Smart Licensing Using Policy

Smart Licensing Using Policy is introduced in Cisco IOS XE Amsterdam 17.3.2. This is therefore the minimum required version for Smart Licensing Using Policy.

Prerequisites

Before you begin the migration, if you want to learn how to perform a new deployment, see Information About Smart Licensing Using Policy, on page 1.

Ensure that you read the Upgrading to Smart Licensing Using Policy, on page 45 section, to understand how Smart Licensing Using Policy handles various aspects of all earlier licensing models.

Note that all the licenses that you are using prior to migration will be available after upgrade. This means that not only registered and authorized licenses (including reserved licenses), but also evaluation licenses will be migrated. The advantage with migrating registered and authorized licenses is that you will have fewer configuration steps to complete after migration, because your configuration is retained after upgrade (transport type configuration and configuration for connection to CSSM, all authorization codes). This ensures a smoother transition to the Smart Licensing Using Policy environment.

Device-led conversion is not supported for migration to Smart Licensing Using Policy.

Upgrading to Smart Licensing Using Policy

This section explains the following aspects:

- Migrating from earlier licensing models to Smart Licensing Using Policy.

  Earlier licensing models include Smart Licensing, Specific License Reservation (SLR), Right-to-Use Licensing (RTU), and evaluation or expired licenses from earlier licensing models. The Sample Migration Scenarios, on page 51 section provides details and examples for migration scenarios.

  Device-led conversion is not supported for migration to Smart Licensing Using Policy.

- Upgrading in the Smart Licensing Using Policy environment - where the software version you are upgrading from and the software version you are upgrading to, both support Smart Licensing Using Policy.

For more information, see the subsequent sections.

Identifying the Current Licensing Model Before Upgrade

Before you upgrade to Smart Licensing Using Policy, if you want to know the current licensing model that is effective on the product instance, enter the **show license all** command in privileged EXEC mode. This command displays information about the current licensing model for all except the RTU licensing model. The **show license right-to-use** privileged EXEC command displays license information only if the licensing model is RTU.

How Upgrade Affects Enforcement Types for Existing Licenses

When you upgrade to a software version which supports Smart Licensing Using Policy, the way existing licenses are handled, depends primarily on the license enforcement type.

- An unenforced license that was being used before upgrade, continues to be available after the upgrade. This includes all licenses from all earlier licensing models.
  - Smart Licensing.
  - Specific License Reservation (SLR), which has an accompanying authorization code. The authorization code continues to be valid after upgrade to Smart Licensing Using Policy and authorizes existing license consumption.
  - Right-to-Use (RTU) Licensing.
  - Evaluation or expired licenses from any of the above mentioned licensing models.
- An enforced or export-controlled license that was being used before upgrade, continues to be available after upgrade if the required authorization exists.

  An export-controlled license is supported on certain models and only starting from Cisco IOS XE Bengaluru 17.6.2. No export-controlled or enforced licenses were available on any of the Cisco Catalyst Access, Core, and Aggregation Switches prior to this.

How Upgrade Affects Reporting for Existing Licenses

Existing License	Reporting Requirements After Migration to Smart Licensing Using Policy
Right-to-Use (RTU)	Depends on the license being used. After migration and deployment of a supported topology, in output of the **show license usage** command, refer to the `Next ACK deadline` field to know if and when reporting is required.
Specific License Reservation (SLR)	Required only if there is a change in license consumption. An existing SLR authorization code authorizes existing license consumption after upgrade to Smart Licensing Using Policy.

Existing License	Reporting Requirements After Migration to Smart Licensing Using Policy
Smart Licensing (Registered and Authorized licenses): Reporting for these licenses is based on the reporting requirements in the policy.	Depends on the policy.
Evaluation or expired licenses	Based on the reporting requirements of the Cisco default policy.

How Upgrade Affects Transport Type for Existing Licenses

The transport type, if configured in your existing set-up, is retained after upgrade to Smart Licensing Using Policy.

When compared to the earlier version of Smart Licensing, additional transport types are available with Smart Licensing Using Policy. There is also a change in the default transport mode. The following table clarifies how this may affect upgrades:

Transport type Before Upgrade	License or License State Before Upgrade	Transport Type After Upgrade
Default (callhome)	evaluation	cslu (default in Smart Licensing Using Policy)
	SLR	off
	registered	callhome
smart	evaluation	off
	SLR	off
	registered	smart
Not applicable For example, if the existing licensing model is RTU.	Not applicable For example, if the existing licensing model is RTU.	cslu

How Upgrade Affects the Token Registration Process

In the earlier version of Smart Licensing, a token was used to register and connect to CSSM. ID token registration is not required in Smart Licensing Using Policy. The token generation feature is still available in CSSM, and is used to *establish trust* when a product instance is directly connected to CSSM. See Connected Directly to Cisco SSM, on page 12.

Upgrading the Software Version

See the corresponding release note for the upgrade procedure. If there are any general release-specific considerations, these are called-out in the corresponding release notes. For example, to upgrade to Cisco IOS XE Amsterdam 17.3.2, see *Release Notes for Cisco <platform name>, Cisco IOS XE Amsterdam 17.3.x*.

You can use the procedure to upgrade in install mode or with In-Service Software Upgrade (ISSU) (on supported platforms and supported releases).

See the section "Upgrading the Switch Software" in the catalyst 9000 release notes. The following tables provides links to the respective Cisco Catalyst 9000 Series Switches models along with ISSU support.

Table 6:

Catalyst 9000 Platform	Link	ISSU Supported?
Release Notes for Cisco Catalyst 9200 Series Switches	https://www.cisco.com/c/en/us/support/switches/catalyst-9200-r-series-switches/products-release-notes-list.html	No
Release Notes for Cisco Catalyst 9300 Series Switches	https://www.cisco.com/c/en/us/support/switches/catalyst-9300-series-switches/products-release-notes-list.html	No
Release Notes for Cisco Catalyst 9400 Series Switches	https://www.cisco.com/c/en/us/support/switches/catalyst-9400-series-switches/products-release-notes-list.html	Yes
Release Notes for Cisco Catalyst 9500 Series Switches	https://www.cisco.com/c/en/us/support/switches/catalyst-9500-series-switches/products-release-notes-list.html	Yes
Release Notes for Cisco Catalyst 9600 Series Switches:	https://www.cisco.com/c/en/us/support/switches/catalyst-9600-series-switches/products-release-notes-list.html	Yes

After Upgrading the Software Version

- Complete topology implementation.

  If a transport mode is available in your pre-upgrade set-up, this is retained after you upgrade. Only in some cases, like with evaluation licenses or with licensing models where the notion of a transport type does not exist, the default (**cslu**) is applied - in these cases you may have a few more steps to complete before you are set to operate in the Smart Licensing Using Policy environment.

  No matter which licensing model you upgrade from, you can change the topology after upgrade.

- Synchronize license usage with CSSM

No matter which licensing model you are upgrading from and no matter which topology you implement, synchronize your usage information with CSSM. For this you have to follow the reporting method that applies to the topology you implement. This initial synchronization ensures that up-to-date usage information is reflected in CSSM and a custom policy (if available), is applied. The policy that is applicable after this synchronization also indicates subsequent reporting requirements. These rules are also tabled here: How Upgrade Affects Reporting for Existing Licenses, on page 46

Note After initial usage synchronization is completed, reporting is required only if the policy, or, system messages indicate that it is.

Upgrades Within the Smart Licensing Using Policy Environment

This section covers any release-specific considerations or actions that apply when you upgrade the product instance from one release where Smart Licensing Using Policy is supported to another release where Smart Licensing Using Policy is supported.

Starting with Cisco IOS XE Cupertino 17.7.1, RUM reports are stored in a format that reduces processing time. In order to ensure that there are no usage reporting inconsistencies resulting from the differences in the old and new formats, we recommend completing one round of usage reporting as a standard practice when upgrading from an earlier release that supports Smart Licensing Using Policy, to Cisco IOS XE Cupertino 17.7.1 or a later release.

Downgrading from Smart Licensing Using Policy

This section provides information about downgrades to an earlier licensing model, for new deployments and existing deployments. It also covers information relevant to downgrades within the Smart Licensing Using Policy environment.

New Deployment Downgrade

This section applies if you had a newly purchased product instance with a software version where Smart Licensing Using Policy was already enabled by default and you want to downgrade to a software version where Smart Licensing Using Policy is not supported.

The outcome of the downgrade depends on whether a Trust Code, on page 6 was installed while you were still operating in the Smart Licensing Using Policy environment, and further action may be required depending on the release you downgrade to.

If the topology you implemented while in the Smart Licensing Using Policy environment was "Connected Directly to CSSM", then a trust code installation can be expected or assumed, because it is required as part of topology implementation. For any of the other topologies, trust establishment is not mandatory. Downgrading product instances with one of these other topologies will therefore mean that you have to restore licenses to a registered and authorized state by following the procedures that are applicable in the Smart Licensing environment. See the table below.

Table 7: Outcome and Action for New Deployment Downgrade to Smart Licensing

In the Smart Licensing Using Policy Environment	Downgrade to..	Outcome and Further Action
Standalone product instance, connected directly to CSSM, and trust established.	Cisco IOS XE Amsterdam 17.3.1 OR Cisco IOS XE Gibraltar 16.12.4 and later releases in Cisco IOS XE Gibraltar 16.12.x OR Cisco IOS XE Fuji 16.9.6 and later releases in Cisco IOS XE Fuji 16.9.x	No further action is required. The product instance attempts to renew trust with CSSM after downgrade. After a successful renewal, licenses are in a registered state and the earlier version of Smart Licensing is effective on the product instance.
	Any other release (other than the ones mentioned in the row above) that supports Smart Licensing	Action is required: You must reregister the product instance. Generate an ID token in the CSSM Web UI and on the product instance, configure the **license smart register idtoken** *idtoken* command in global configuration mode.
High Availability set-up, connected directly to CSSM, and trust established.	Any release that supports Smart Licensing	Action is required: You must reregister the product instance. Generate an ID token in the CSSM Web UI and on the product instance, configure the **license smart register idtoken** *idtoken* **all** command in global configuration mode.
Any other topology. (Connected to CSSM Through CSLU, CSLU Disconnected from CSSM, No Connectivity to CSSM and No CSLU)	Any release that supports Smart Licensing	Action is required. Restore licenses to a registered and authorized state by following the procedures that are applicable in the Smart Licensing environment.

Upgrading to Smart Licensing Using Policy and Then Downgrading

Downgrades Within the Smart Licensing Using Policy Environment

This section covers any release-specific considerations or actions that apply when you downgrade the product instance from one release where Smart Licensing Using Policy is supported to another release where Smart Licensing Using Policy is supported.

Starting with Cisco IOS XE Cupertino 17.7.1, RUM reports are stored in a format that reduces processing time. In order to ensure that there are no usage reporting inconsistencies resulting from the differences in the old and new formats, we recommend completing one round of usage reporting as a standard practice when downgrading from Cisco IOS XE Cupertino 17.7.1 or a later release to an earlier release supporting Smart Licensing Using Policy.

Sample Migration Scenarios

Sample migration scenarios have been provided considering the various existing licensing models and licenses. All scenarios provide sample outputs before and after migration, any CSSM Web UI changes to look out for (as an indicator of a successful migration or further action), and how to identify and complete any necessary post-migration steps.

Note For SSM On-Prem, the sequence in which you perform the various upgrade-related activities is crucial. So only for this scenario, the migration sequence has been provided - and not an example.

Example: Smart Licensing to Smart Licensing Using Policy

The following is an example of a Cisco Catalyst 9500 switch migrating from Smart Licensing to Smart Licensing Using Policy. This is a High Availability set-up with an active and standby.

- Table 8: Smart Licensing to Smart Licensing Using Policy: show Commands
- The CSSM Web UI After Migration, on page 55
- Reporting After Migration, on page 58

The **show** command outputs below call-out key fields to check, before and after migration.

Table 8: Smart Licensing to Smart Licensing Using Policy: show Commands

Before Upgrade	After Upgrade
show license summary (Smart Licensing) The `Status` and `License Authorization` fields show that the license is `REGISTERED` and `AUTHORIZED`.	**show license summary** (Smart Licensing Using Policy) The `Status` field shows that the licenses are now `IN USE` instead of registered and authorized.

Before Upgrade	After Upgrade
Device# **show license summary** Smart Licensing is ENABLED Registration: **Status: REGISTERED** Smart Account: SA-Eg-Company-01 Virtual Account: SLE_Test Export-Controlled Functionality: ALLOWED Last Renewal Attempt: None Next Renewal Attempt: Mar 21 11:08:58 2021 PST License Authorization: **Status: AUTHORIZED** Last Communication Attempt: SUCCEEDED Next Communication Attempt: Oct 22 11:09:07 2020 PST License Usage: License Entitlement tag Count Status --- C9500 Network Advantage (C9500 Network Advantage) 2 AUTHORIZED C9500-DNA-16X-A (C9500-16X DNA Advantage) 2 AUTHORIZED	Device# **show license summary** License Usage: License Entitlement tag Count Status --- network-advantage (C9500 Network Advantage) 2 **IN USE** dna-advantage (C9500-16X DNA Advantage) 2 **IN USE**

show license usage (Smart Licensing)	**show license usage** (Smart Licensing Using Policy)
	The license counts remain the same. The `Enforcement Type` field displays NOT ENFORCED, because licenses that were being used prior to upgrade were unenforced lic
Device# **show license usage** License Authorization: Status: AUTHORIZED on Sep 22 11:09:07 2020 PST C9500 Network Advantage (C9500 Network Advantage): Description: C9500 Network Advantage **Count: 2** Version: 1.0 **Status: AUTHORIZED** Export status: NOT RESTRICTED C9500-DNA-16X-A (C9500-16X DNA Advantage): Description: C9500-DNA-16X-A **Count: 2** Version: 1.0 **Status: AUTHORIZED** Export status: NOT RESTRICTED	Device# **show license usage** License Authorization: Status: Not Applicable network-advantage (C9500 Network Advantage): Description: network-advantage **Count: 2** Version: 1.0 Status: IN USE Export status: NOT RESTRICTED Feature Name: network-advantage Feature Description: network-advantage **Enforcement type: NOT ENFORCED** **License type: Perpetual** dna-advantage (C9500-16X DNA Advantage): Description: C9500-16X DNA Advantage **Count: 2** Version: 1.0 Status: IN USE Export status: NOT RESTRICTED Feature Name: dna-advantage Feature Description: C9500-16X DNA Advantage **Enforcement type: NOT ENFORCED** **License type: Subscription**

show license status (Smart Licensing)	**show license status** (Smart Licensing Using Policy)
	The `Transport:` field: A transport type was configured and therefore retained after upgrade. The `Policy:` header and details: A custom policy was available in the Smart Account or Virtual Account – this has also been automatically installed on the product instance. (After establishing trust, CSSM returns a policy. The policy is then automatically installed.) The `Usage Reporting:` header: The `Next report push:` field provides information about when the product instance will send the next RUM report to CSSM. The `Trust Code Installed:` field: The ID token is successfully converted and a trusted connected has been established with CSSM.

```
Device# show license status

Smart Licensing is ENABLED
Utility:
Status: DISABLED
Data Privacy:
Sending Hostname: yes
Callhome hostname privacy: DISABLED
Smart Licensing hostname privacy: DISABLED
Version privacy: DISABLED
Transport:
Type: Callhome
Registration:
Status: REGISTERED
Smart Account: Eg-SA-01
Virtual Account: Eg-VA-01
Export-Controlled Functionality: ALLOWED
Initial Registration: SUCCEEDED on Sep 22 11:08:58 2020 PST
Last Renewal Attempt: None
Next Renewal Attempt: Mar 21 11:08:57 2021 PST
Registration Expires: Sep 22 11:04:23 2021 PST
License Authorization:
Status: AUTHORIZED on Sep 22 11:09:07 2020 PST
Last Communication Attempt: SUCCEEDED on Sep 22 11:09:07 2020
PST
Next Communication Attempt: Oct 22 11:09:06 2020 PST
Communication Deadline: Dec 21 11:04:34 2020 PST
Export Authorization Key:
Features Authorized:
<none>
Miscellaneus:
Custom Id: <empty>
```

```
Device# show license status

Utility:
  Status: DISABLED
Smart Licensing Using Policy:
  Status: ENABLED
Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED

  Version privacy: DISABLED
Transport:
  Type: Callhome
Policy:
  Policy in use: Merged from multiple sources.

  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO
 default)
    Reporting frequency (days): 0 (CISCO
default)
    Report on change (days): 90 (CISCO default)

  Unenforced/Non-Export Subscription
Attributes:
    First report requirement (days): 90 (CISCO
 default)
    Reporting frequency (days): 90 (CISCO
default)
    Report on change (days): 90 (CISCO default)

  Enforced (Perpetual/Subscription) License
Attributes:
    First report requirement (days): 0 (CISCO
 default)
    Reporting frequency (days): 0 (CISCO
default)
    Report on change (days): 0 (CISCO default)

  Export (Perpetual/Subscription) License
Attributes:
    First report requirement (days): 0 (CISCO
 default)
    Reporting frequency (days): 0 (CISCO
default)
    Report on change (days): 0 (CISCO default)
Miscellaneous:
  Custom Id: <empty>
Usage Reporting:
  Last ACK received: Sep 22 13:49:38 2020 PST
  Next ACK deadline: Dec 21 12:02:21 2020 PST
  Reporting push interval: 30 days
  Next ACK push check: Sep 22 12:20:34 2020
PST
  Next report push: Oct 22 12:05:43 2020 PST
  Last report push: Sep 22 12:05:43 2020 PST
  Last report file write: <none>
Trust Code Installed:
  Active: PID:C9500-16X,SN:FCW2233A5ZV
  INSTALLED on Sep 22 12:02:20 2020 PST
  Standby: PID:C9500-16X,SN:FCW2233A5ZY
  INSTALLED on Sep 22 12:02:20 2020 PST
```

show license udi (Smart Licensing)	**show license udi** (Smart Licensing Using Policy)
	This is a High Availability set-up and the command displays all UDIs in the set-up.

`Device# show license udi`
 	
`UDI: PID:C9500-16X,SN:FCW2233A5ZV`
`HA UDI List:`
`Active:PID:C9500-16X,SN:FCW2233A5ZV`
`Standby:PID:C9500-16X,SN:FCW2233A5ZY`
	`Device# show license udi`
	
	`UDI: PID:C9500-16X,SN:FCW2233A5ZV`
	`HA UDI List:`
	`Active:PID:C9500-16X,SN:FCW2233A5ZV`
	`Standby:PID:C9500-16X,SN:FCW2233A5ZY`

The CSSM Web UI After Migration

Log in to the CSSM Web UI at https://software.cisco.com. Under **Smart Software Licensing**, click the **Manage licenses**link.

Click the **Inventory** tab. From the **Virtual Account** drop-down list, choose the required virtual account. Click the **Product Instances** tab.

Registered licenses in the Smart Licensing environment were displayed with the hostname of the product instance in the Name column. After upgrade to Smart Licensing Using Policy, they are displayed with the UDI of the product instance. All migrated UDIs are displayed. In this example, they are PID:C9500-16X,SN:FCW2233A5ZV and PID:C9500-16X,SN:FCW2233A5ZY.

Only the active product instance reports usage, therefore PID:C9500-16X,SN:FCW2233A5ZV displays license consumption information under **License Usage**. The standby does not report usage and the **License Usage** section for the standby displays No Records Found.

It is always the active that reports usage, so if the active in this High Availabilty set-up changes, the new active product instance will display license consumption information and report usage.

Figure 7: Smart Licensing to Smart Licensing Using Policy: Active and Standby Product Instances After Migration

Figure 8: Smart Licensing to Smart Licensing Using Policy: UDI and License Usage under Active Product Instance

Reporting After Migration

The product instance sends the next RUM report to CSSM, based on the policy.

If you want to change your reporting interval to report more frequently: on the product instance, configure the **license smart usage interval** command. For syntax details see the *license smart (global config)* command in the Command Reference for the corresponding release.

Example: RTU Licensing to Smart Licensing Using Policy

The following is an example of a Cisco Catalyst 9300 switch migrating from Right-to-Use (RTU) Licensing to Smart Licensing Using Policy. This is a set-up with an active and members.

RTU Licensing is available on Cisco Catalyst 9300, 9400, and 9500 Series Switches until Cisco IOS XE Fuji 16.8.x. Smart Licensing was introduced starting from Cisco IOS XE Fuji 16.9.1.

When the software version is upgraded to one that supports Smart Licensing Using Policy, all licenses are displayed as IN USE and the `Cisco default` policy is applied on the product instance. If any add-on licenses are used, the `Cisco default` policy requires usage reporting in 90 days. No export-controlled or enforced licenses were available on Cisco Catalyst Access, Core, and Aggregation Switches when the RTU licensing model was supported, and therefore no functionality is lost.

- Table 9: RTU Licensing to Smart Licensing Using Policy: show Commands
- The CSSM Web UI After Migration, on page 60
- Reporting After Migration, on page 61

The table below calls out key changes or new fields to check for in the **show** command outputs, after upgrade to Smart Licensing Using Policy

Table 9: RTU Licensing to Smart Licensing Using Policy: show Commands

Before Upgrade	After Upgrade

show license right-to-use summary (RTU Licensing)
 	
`Device# show license right-to-use summary`
`License Name Type Period left`
`---`
`network-essentials Permanent Lifetime`
`dna-essentials Subscription CSSM Managed`
`---`
 	
`License Level In Use: network-essentials+dna-essentials Subscription`
`License Level on Reboot: network-essentials+dna-essentials Subscription`
	show license summary (Smart Licensing Using Policy)
	
	All licenses are migrated and `IN USE`.
	
	`Device#show license summary`
	`License Usage:`
	`License Entitlement Tag Count Status`
	`---`
	`network-essentials (C9300-24 Network Essen...) 2 IN USE`
	`dna-essentials (C9300-24 DNA Essentials) 2 IN USE`
	`network-essentials (C9300-48 Network Essen...) 1 IN USE`
	`dna-essentials (C9300-48 DNA Essentials) 1 IN USE`

show license right-to-use usage (Smart Licensing)

```
Device# show license right-to-use usage

Slot# License Name Type usage-duration(y:m:d) In-Use
EULA
-------------------------------------------------------
1 network-essentials Permanent 00:00:00 yes yes
1 network-essentials Evaluation 00:00:00 no no
1 network-essentials Subscription 00:00:00 no no
1 network-advantage Permanent 00:00:00 no no
1 network-advantage Evaluation 00:00:00 no no
1 network-advantage Subscription 00:00:00 no no
1 dna-essentials Evaluation 00:00:00 no no
1 dna-essentials Subscription 00:00:00 yes yes
1 dna-advantage Evaluation 00:00:00 no no
1 dna-advantage Subscription 00:00:00 no no
-------------------------------------------------------
Slot# License Name Type usage-duration(y:m:d) In-Use
EULA
-------------------------------------------------------
2 network-essentials Permanent 00:00:00 yes yes
2 network-essentials Evaluation 00:00:00 no no
2 network-essentials Subscription 00:00:00 no no
2 network-advantage Permanent 00:00:00 no no
2 network-advantage Evaluation 00:00:00 no no
2 network-advantage Subscription 00:00:00 no no
2 dna-essentials Evaluation 00:00:00 no no
2 dna-essentials Subscription 00:00:00 yes yes
2 dna-advantage Evaluation 00:00:00 no no
2 dna-advantage Subscription 00:00:00 no no
-------------------------------------------------------
Slot# License Name Type usage-duration(y:m:d) In-Use
EULA
-------------------------------------------------------
3 network-essentials Permanent 00:00:00 yes yes
3 network-essentials Evaluation 00:00:00 no no
3 network-essentials Subscription 00:00:00 no no
3 network-advantage Permanent 00:00:00 no no
3 network-advantage Evaluation 00:00:00 no no
3 network-advantage Subscription 00:00:00 no no
3 dna-essentials Evaluation 00:00:00 no no
3 dna-essentials Subscription 00:00:00 yes yes
3 dna-advantage Evaluation 00:00:00 no no
3 dna-advantage Subscription 00:00:00 no no
-------------------------------------------------------
```

show license usage (Smart Licensing Using Policy)

All licenses (permanent, subscription) have been migrated and the licenses are now `IN USE` and have types `Perpetual` and `Subscription`.

The `Enforcement Type` field displays NOT ENFORCED, because all the licenses that were being using prior to upgrade, were unenforced licenses.

```
Device# show license usage

License Authorization:
  Status: Not Applicable
network-advantage (C9300-24 Network Advantage):
  Description: C9300-24 Network Advantage
  Count: 2
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: C9300-24 Network Advantage
  Enforcement type: NOT ENFORCED
  License type: Perpetual
dna-advantage (C9300-24 DNA Advantage):
  Description: C9300-24 DNA Advantage
  Count: 2
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage
  Feature Description: C9300-24 DNA Advantage
  Enforcement type: NOT ENFORCED
  License type: Subscription
network-advantage (C9300-48 Network Advantage):
  Description: C9300-48 Network Advantage
  Count: 1
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: C9300-48 Network Advantage
  Enforcement type: NOT ENFORCED
  License type: Perpetual
dna-advantage (C9300-48 DNA Advantage):
  Description: C9300-48 DNA Advantage
  Count: 1
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage
  Feature Description: C9300-48 DNA Advantage
  Enforcement type: NOT ENFORCED
  License type: Subscription
```

show license right-to-use (RTU Licensing)	**show license status** (Smart Licensing Using Policy)
	The `Transport:` field displays its off. The `Trust Code Installed:` field displays that a trust code is not installed. Under the `Usage Reporting:` header, the `Next report push:` field provides information about when the next RUM report must be sent to CSSM.

`Device# show license right-to-use`
`Slot# License Name Type Period left`
`---`
`1 network-essentials Permanent Lifetime`
`1 dna-essentials Subscription CSSM Managed`
`---`
`License Level on Reboot:`
`network-essentials+dna-essentials`
`Subscription`
 	
`Slot# License Name Type Period left`
`---`
`2 network-essentials Permanent Lifetime`
`2 dna-essentials Subscription CSSM Managed`
`---`
`License Level on Reboot:`
`network-essentials+dna-essentials`
`Subscription`
 	
`Slot# License Name Type Period left`
`---`
`3 network-essentials Permanent Lifetime`
`3 dna-essentials Subscription CSSM Managed`
`---`
`License Level on Reboot:`
`network-essentials+dna-essentials`
`Subscription`
	`Device# show license status`
	`Utility:`
	`  Status: DISABLED`
	`Smart Licensing Using Policy:`
	`  Status: ENABLED`
	`Data Privacy:`
	`  Sending Hostname: yes`
	`    Callhome hostname privacy: DISABLED`
	`    Smart Licensing hostname privacy: DISABLED`
	`  Version privacy: DISABLED`
	`Transport:`
	`  Type: Transport Off`
	`Policy:`
	`  Policy in use: Merged from multiple sources.`
	`  Reporting ACK required: yes (CISCO default)`
	`  Unenforced/Non-Export Perpetual Attributes:`
	`    First report requirement (days): 365 (CISCO default)`
	
	`    Reporting frequency (days): 0 (CISCO default)`
	`    Report on change (days): 90 (CISCO default)`
	`  Unenforced/Non-Export Subscription Attributes:`
	`    First report requirement (days): 90 (CISCO default)`
	
	`    Reporting frequency (days): 90 (CISCO default)`
	`    Report on change (days): 90 (CISCO default)`
	`  Enforced (Perpetual/Subscription) License Attributes:`
	
	`    First report requirement (days): 0 (CISCO default)`
	`    Reporting frequency (days): 0 (CISCO default)`
	`    Report on change (days): 0 (CISCO default)`
	`  Export (Perpetual/Subscription) License Attributes:`
	`    First report requirement (days): 0 (CISCO default)`
	`    Reporting frequency (days): 0 (CISCO default)`
	`    Report on change (days): 0 (CISCO default)`
	`Miscellaneous:`
	`  Custom Id: <empty>`
	`Usage Reporting:`
	`  Last ACK received: <none>`
	`  Next ACK deadline: Jan 26 10:27:59 2021 PST`
	`  Reporting push interval: 20  days`
	`  Next ACK push check: <none>`
	`  Next report push: Oct 28 10:29:59 2020 PST`
	`  Last report push: <none>`
	`  Last report file write: <none>`
	`Trust Code Installed: <none>`

The CSSM Web UI After Migration

No changes in the CSSM Web UI.

Reporting After Migration

Implement any one of the supported topologies, and fulfil reporting requirements. See Connecting to Cisco SSM, on page 12 and Implementing Smart Licensing Using Policy, on page 27. The reporting method you can use depends on the topology you implement.

Example: SLR to Smart Licensing Using Policy

The following is an example of a Cisco Catalyst 9500 switch migrating from Specific License Reservation (SLR) to Smart Licensing Using Policy. This is a High Availability set-up with an active and standby.

The license conversion is automatic and authorization codes are migratied. No further action is required to complete migration. After migration the No Connectivity to Cisco SSM and No CSLU, on page 19 topology is effective. For information about the SLR authorization code in the Smart Licensing Using Policy environment, see Authorization Code, on page 3.

- Table 10: SLR to Smart Licensing Using Policy: show Commands
- The CSSM Web UI After Migration, on page 67
- Reporting After Migration, on page 70

The **show** command outputs below call-out key fields to check, before and after migration.

Table 10: SLR to Smart Licensing Using Policy: show Commands

Before Upgrade	After Upgrade

show license summary (SLR)
 	
The `Registration` and `License Authorization` status fields show that the license was `REGISTERED - SPECIFIC LICENSE RESERVATION` and `AUTHORIZED - RESERVED`.
 	
`Device# show license summary`
 	
`Smart Licensing is ENABLED`
`License Reservation is ENABLED`
`Registration:`
`  Status: REGISTERED - SPECIFIC LICENSE RESERVATION`
`Export-Controlled Functionality: ALLOWED`
`License Authorization:`
`  Status: AUTHORIZED - RESERVED`
`License Usage:`
`License  Entitlement tag  Count Status`
`---`
`C9500 Network Advantage (C9500 Network Advantage)  2 AUTHORIZED`
`C9500-DNA-16X-A  (C9500-16X DNA Advantage)  2 AUTHORIZED`
	show license summary (Smart Licensing Using Policy)
	
	The `Status` field shows that the licenses are now `IN USE` instead of registered and authorized.
	
	`Device# show license summary`
	
	`License Reservation is ENABLED`
	`License Usage:`
	`License  Entitlement tag  Count Status`
	`---`
	`network-advantage (C9500 Network Advantage)  2 IN USE`
	`dna-advantage  (C9500-16X DNA Advantage)  2 IN USE`

show license reservation (SLR)	**show license all** (Smart Licensing Using Policy) The `License Authorizations` header: shows that base (C9500 Network Advantage) and add-on (C9500-DNA-16X-A) licenses on the active and standby product instances were authorized with Specific License Reservation. The `Authorization type:` field shows SPECIFIC INSTALLED. The `Last Confirmation code:` field: shows that the SLR authorization code is successfully migrated for the active and standby product instances in the High Availability set-up.

```
Device# show license reservation
License reservation: ENABLED
Overall status:
  Active: PID:C9500-16X,SN:FCW2233A5ZV
      Reservation status: SPECIFIC INSTALLED on Aug 31
 10:15:01 2020 PDT
      Export-Controlled Functionality: ALLOWED
      Last Confirmation code: 4bfbea7f
  Standby: PID:C9500-16X,SN:FCW2233A5ZY
      Reservation status: SPECIFIC INSTALLED on Aug 31
 10:15:01 2020 PDT
      Export-Controlled Functionality: ALLOWED
      Last Confirmation code: 9394f196
Specified license reservations:
  C9500 Network Advantage (C9500 Network Advantage):
    Description: C9500 Network Advantage
    Total reserved count: 2
    Term information:
      Active: PID:C9500-16X,SN:FCW2233A5ZV
        License type: PERPETUAL
          Term Count: 1
      Standby: PID:C9500-16X,SN:FCW2233A5ZY
        License type: PERPETUAL
          Term Count: 1
  C9500-DNA-16X-A (C9500-16X DNA Advantage):
    Description: C9500-DNA-16X-A
    Total reserved count: 2
    Term information:
      Active: PID:C9500-16X,SN:FCW2233A5ZV
        License type: TERM
          Start Date: 2020-MAR-17 UTC
          End Date: 2021-MAR-17 UTC
          Term Count: 1
      Standby: PID:C9500-16X,SN:FCW2233A5ZY
```

```
Device# show license reservation

Smart Licensing Status
======================
Smart Licensing is ENABLED
License Reservation is ENABLED
Export Authorization Key:
  Features Authorized:
    <none>
Utility:
  Status: DISABLED
Smart Licensing Using Policy:
  Status: ENABLED
Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED
Transport:
  Type: Transport Off
Miscellaneous:
  Custom Id: <empty>
Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)

    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)

    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Enforced (Perpetual/Subscription) License Attributes:

    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
Usage Reporting:
  Last ACK received: <none>
  Next ACK deadline: Nov 29 10:50:05 2020 PDT
  Reporting Interval: 30
  Next ACK push check: <none>
  Next report push: Aug 31 10:52:05 2020 PDT
  Last report push: <none>
  Last report file write: <none>
Trust Code Installed: <none>
License Usage
=============
network-advantage (C9500 Network Advantage):
  Description: network-advantage
  Count: 2
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: network-advantage
  Enforcement type: NOT ENFORCED
```

```
  License type: Perpetual
  Reservation:
    Reservation status: SPECIFIC INSTALLED
    Total reserved count: 2
dna-advantage (C9500-16X DNA Advantage):
  Description: C9500-16X DNA Advantage
  Count: 2
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage
  Feature Description: C9500-16X DNA Advantage
  Enforcement type: NOT ENFORCED
  License type: Subscription
  Reservation:
    Reservation status: SPECIFIC INSTALLED
    Total reserved count: 2
Product Information
===================
UDI: PID:C9500-16X,SN:FCW2233A5ZV
HA UDI List:
    Active:PID:C9500-16X,SN:FCW2233A5ZV
    Standby:PID:C9500-16X,SN:FCW2233A5ZY
Agent Version
=============
Smart Agent for Licensing: 5.0.5_rel/42
License Authorizations
======================
Overall status:
  Active: PID:C9500-16X,SN:FCW2233A5ZV
     Status: SPECIFIC INSTALLED on Aug 31 10:15:01 2020
 PDT
      Last Confirmation code: 4bfbea7f
  Standby: PID:C9500-16X,SN:FCW2233A5ZY
     Status: SPECIFIC INSTALLED on Aug 31 10:15:01 2020
 PDT
      Last Confirmation code: 9394f196
Specified license reservations:
  C9500 Network Advantage (C9500 Network Advantage):
    Description: C9500 Network Advantage
    Total reserved count: 2
    Enforcement type: NOT ENFORCED
    Term information:
      Active: PID:C9500-16X,SN:FCW2233A5ZV
        Authorization type: SPECIFIC INSTALLED on Aug
31 10:15:01 2020 PDT
        License type: PERPETUAL
          Term Count: 1
      Standby: PID:C9500-16X,SN:FCW2233A5ZY
        Authorization type: SPECIFIC INSTALLED on Aug
31 10:15:01 2020 PDT
        License type: PERPETUAL
          Term Count: 1
  C9500-DNA-16X-A (C9500-16X DNA Advantage):
    Description: C9500-DNA-16X-A
    Total reserved count: 2
    Enforcement type: NOT ENFORCED
    Term information:
      Active: PID:C9500-16X,SN:FCW2233A5ZV
        Authorization type: SPECIFIC INSTALLED on Aug
31 10:15:01 2020 PDT
        License type: PERPETUAL
          Term Count: 1
      Standby: PID:C9500-16X,SN:FCW2233A5ZY
```

	Authorization type: SPECIFIC INSTALLED on Aug 31 10:15:01 2020 PDT License type: PERPETUAL Term Count: 1 Purchased Licenses: No Purchase Information Available Derived Licenses: Entitlement Tag: regid.2017-03.com.cisco.advantagek9-Nyquist-C9500, 1.0_f1563759-2e03-4a4c-bec5-5feec525a12c Entitlement Tag: regid.2017-07.com.cisco.C9500-DNA-16X-A, 1.0_ef3574d1-156b-486a-864f-9f779ff3ee49
show license status (SLR)	**show license status** (Smart Licensing Using Policy) The `Transport:` header: `Type:` displays that the transport type is set to off. The `Usage Reporting:` header: `Next report push:` field displays if and when the next RUM report must be uploaded to CSSM.

```
Device# show license status

Smart Licensing is ENABLED
Utility:
  Status: DISABLED
License Reservation is ENABLED
Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED
Transport:
  Type: Callhome
Registration:
  Status: REGISTERED - SPECIFIC LICENSE RESERVATION
  Export-Controlled Functionality: ALLOWED
  Initial Registration: SUCCEEDED on Aug 31 11:07:39
2020 PDT
License Authorization:
  Status: AUTHORIZED - RESERVED on Aug 31 10:15:01 2020
 PDT
Export Authorization Key:
  Features Authorized:
    <none>
        License type: TERM
          Start Date: 2020-MAR-17 UTC
          End Date: 2021-MAR-17 UTC
          Term Count: 1
```

```
Device# show license status

Utility:
  Status: DISABLED
License Reservation is ENABLED
Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
   Version privacy: DISABLED
Transport:
  Type: Transport Off
Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)

    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)

    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Enforced (Perpetual/Subscription) License Attributes:

    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
Miscellaneous:
  Custom Id: <empty>
Usage Reporting:
  Last ACK received: <none>
  Next ACK deadline: Nov 29 10:50:05 2020 PDT
  Reporting Interval: 30
  Next ACK push check: <none>
  Next report push: Aug 31 10:52:05 2020 PDT
  Last report push: <none>
  Last report file write: <none>
Trust Code Installed: <none>
```

The CSSM Web UI After Migration

In CSSM, there are no changes in the **Product Instances** tab. The Last Contact column displays "Reserved Licenses" since there has been no usage reporting yet.

After the requisite RUM report is uploaded and acknowledged "Reserved Licenses" and license usage will only be seen in the Active PID product Instance.

Figure 9: SLR to Smart Licensing Using Policy: Active and Standby Product Instances After Migration, Before Reporting

Figure 10: SLR to Smart Licensing Using Policy: Active and Standby Product Instances After Migration, After Reporting

Reporting After Migration

SLR licenses require reporting only when there is a change in licensing consumption (For example, when using an add-on license which is for specified term). The policy (**show license status**) indicates this, or you will receive syslog messages about this.

Since all communication to and from the product instance is disabled, to report license usage you must save RUM reports to a file and upload it to CSSM (from a workstation that has connectivity to the internet, and Cisco):

1. Generate and save RUM reports.

   Enter the **license smart save usage** command in provileged EXEC mode. In the example below, all RUM reports are saved to the flash memory of the product instance, in file `all_rum.txt`. For syntax details see the *license smart (privileged EXEC)* command in the Command Reference for the corresponding release. In the example, the file is first saved to bootflash and then copied to a TFTP location:

   ```
   Device# license smart save usage all file bootflash:all_rum.txt
   Device# copy bootflash:all_rum.txt tftp://10.8.0.6/all_rum.txt
   ```

2. Upload usage data to CSSM: Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124.

3. Install the ACK on the product instance: Installing a File on the Product Instance, on page 125.

Example: Evaluation or Expired to Smart Licensing Using Policy

The following is an example of a Cisco Catalyst 9500 switch with evaluation licenses (Smart Licensing) that are migrated to Smart Licensing Using Policy.

The notion of evaluation licenses does not apply to Smart Licensing Using Policy. When the software version is upgraded to one that supports Smart Licensing Using Policy, all licenses are displayed as IN USE and the Cisco default policy is applied to the product instance. No export-controlled or enforced licenses were available on Cisco Catalyst Access, Core, and Aggregation Switches when the earlier licensing models were effective, and therefore no functionality is lost.

The table below calls out key changes or new fields to check for in the **show** command outputs, after upgrade to Smart Licensing Using Policy

Table 11: Evaluation or Expired to Smart Licensing Using Policy: show Commands

Before Upgrade	After Upgrade
show license summary (Smart Licensing, Evaluation Mode) Licenses are UNREGISTERED and in `EVAL MODE`.	**show license summary** (Smart Licensing Using Policy) All licenses are migrated and `IN USE`. There are no EVAL MODE licenses.

Before Upgrade	After Upgrade

`Device# show license summary`
 	
`Smart Licensing is ENABLED`
`Registration:`
`Status: UNREGISTERED`
`Export-Controlled Functionality: NOT ALLOWED`
`License Authorization:`
`Status: EVAL MODE`
`Evaluation Period Remaining: 89 days, 21 hours, 37 minutes,`
`30 seconds`
`License Usage:`
`License Entitlement tag Count Status`
`---`
`(C9500 Network Advantage) 2 EVAL MODE`
`(C9500-16X DNA Advantage) 2 EVAL MODE`
	`Device# show license summary`
	
	`License Usage:`
	`License Entitlement tag Count Status`
	`---`
	`network-advantage (C9500 Network Advantage) 2 IN USE`
	`dna-advantage (C9500-16X DNA Advantage) 2 IN USE`

show license usage (Smart Licensing, Evaluation Mode)	**show license usage** (Smart Licensing Using Policy)

`Device# show license usage`
 	
`License Authorization:`
`Status: EVAL MODE`
`Evaluation Period Remaining: 89 days, 21 hours, 37 minutes,`
`21 seconds`
`(C9500 Network Advantage):`
`Description:`
`Count: 2`
`Version: 1.0`
`Status: EVAL MODE`
`Export status: NOT RESTRICTED`
`(C9500-16X DNA Advantage):`
`Description:`
`Count: 2`
`Version: 1.0`
`Status: EVAL MODE`
`Export status: NOT RESTRICTED`
	The `Enforcement Type` field displays NOT ENFORCED, because all the licenses that were being using prior to upgrade, were unenforced licenses.
	
	`Device# show license usage`
	`License Authorization:`
	`Status: Not Applicable`
	`network-advantage (C9500 Network Advantage):`
	`Description: network-advantage`
	`Count: 2`
	`Version: 1.0`
	`Status: IN USE`
	`Export status: NOT RESTRICTED`
	`Feature Name: network-advantage`
	`Feature Description: network-advantage`
	`Enforcement type: NOT ENFORCED`
	`License type: Perpetual`
	`dna-advantage (C9500-16X DNA Advantage):`
	`Description: C9500-16X DNA Advantage`
	`Count: 2`
	`Version: 1.0`
	`Status: IN USE`
	`Export status: NOT RESTRICTED`
	`Feature Name: dna-advantage`
	`Feature Description: C9500-16X DNA Advantage`
	`Enforcement type: NOT ENFORCED`
	`License type: Subscription`

show license status (Smart Licensing, Evaluation Mode)	**show license status** (Smart Licensing Using Policy)
	The `Transport:` field displays that its off. The `Policy` field shows that the Cisco default policy is applied The `Trust Code Installed:` field displays that a trust code is not installed. The `Usage Reporting:` header: The `Next report push:` field provides information about when the next RUM report must be sent to CSSM.

```
Switch# show license status

Smart Licensing is ENABLED
Utility:
Status: DISABLED
Data Privacy:
Sending Hostname: yes
Callhome hostname privacy: DISABLED
Smart Licensing hostname privacy: DISABLED
Version privacy: DISABLED
Transport:
Type: Callhome
Registration:
Status: UNREGISTERED
Export-Controlled Functionality: NOT ALLOWED
License Authorization:
Status: EVAL MODE
Evaluation Period Remaining: 89 days, 21 hours, 37
minutes, 15 seconds
Export Authorization Key:
Features Authorized:
<none>
Miscellaneus:
Custom Id: <empty>
```

```
Switch# show license status

Utility:
  Status: DISABLED
Smart Licensing Using Policy:
  Status: ENABLED
Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED
Transport:
  Type: Transport Off
Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)

    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)

    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Enforced (Perpetual/Subscription) License Attributes:

    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
Miscellaneous:
  Custom Id: <empty>
Usage Reporting:
  Last ACK received: <none>
  Next ACK deadline: Jan 26 10:27:59 2021 PST
  Reporting push interval: 20  days
  Next ACK push check: <none>
  Next report push: Oct 28 10:29:59 2020 PST
  Last report push: <none>
  Last report file write: <none>
Trust Code Installed: <none>
```

The CSSM Web UI After Migration

No changes in the CSSM Web UI.

Reporting After Migration

Implement any one of the supported topologies, and fulfil reporting requirements. See Connecting to Cisco SSM, on page 12 and Implementing Smart Licensing Using Policy, on page 27. The reporting method you can use depends on the topology you implement.

Migrating to a Version of SSM On-Prem That Supports Smart Licensing Using Policy

If you are using a version of SSM On-Prem that is earlier than the minimum required version (See SSM On-Prem Deployment, on page 20), you can use this section as an outline of the process and sequence you have to follow to migrate the SSM On-Prem version, the product instance, and any other tasks like SLAC installation, if applicable.

1. Upgrade SSM On-Prem.

   Upgrade to the minimum required Version 8, Release 202102 or a later version.

   Refer to the Cisco Smart Software Manager On-Prem Migration Guide.

2. Upgrade the product instance.

   For information about when Smart Licensing Using Policy was introduced on a supported product instance, see Supported Products, on page 1.

   For information about the upgrade procedure, see Upgrading the Software Version, on page 48.

3. Re-Register a local account with CSSM

   Online and Offline options are available. Refer to the Cisco Smart Software Manager On-Prem Migration Guide > *Re-Registering a local Account (Online Mode)* or *Manually Re-Registering a Local Account (Offline Mode)* .

   Once re-registration is complete, the following events occur automatically:

   - SSM On-Prem responds with new transport URL that points to the tenant in SSM On-Prem.
   - The transport type configuration on the product instance changes from from **call-home** or **smart**, to **cslu**. The transport URL is also updated automatically.

4. Save configuration changes on the product instance, by entering the **copy running-config startup-config** command in privileged EXEC mode.

5. Clear older On-Prem Smart Licensing certificates on the product instance and reload the product instance. Do not save configuration changes after this.

Note This step is required only if the software version running on the product instance is Cisco IOS XE Amsterdam 17.3.x or Cisco IOS XE Bengaluru 17.4.x.

   Enter the **license smart factory reset** and then the **reload** commands in privileged EXEC mode.

```
Device# license smart factory reset
Device# reload
```

6. Perform usage synchronization

   a. On the product instance, enter the **license smart sync** {**all**|**local**} command, in privileged EXEC mode. This synchronizes the product instance with SSM On-Prem, to send and receive any pending data.

```
Device(config)# license smart sync local
```

You can verify this in the SSM On-Prem UI. Go to **Inventory** > **SL Using Policy**. In the **Alerts** column, the following message is displayed: Usage report from product instance.

b. Synchronize usage information with CSSM (*choose one*)

- Option 1:

  SSM On-Prem is connected to CSSM: In the SSM On-Prem UI, Smart Licensing workspace, nagivate to **Reports** > **Usage Schedules** > **Synchronize now with Cisco**.

- Option 2:

  SSM On-Prem is not connected to CSSM. See Exporting and Importing Usage Data (SSM On-Prem UI), on page 99.

Result:

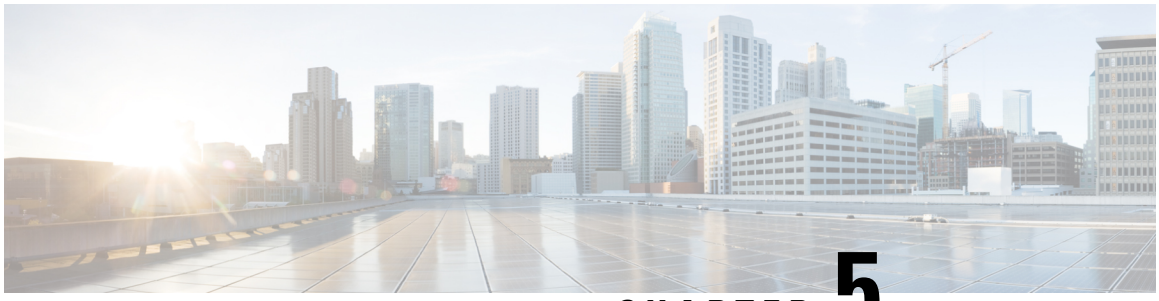
You have completed migration and initial usage synchronization. Product instance and license usage information is now displayed in SSM On-Prem.

For subsequent reporting, you have the following options:

- To synchronize data between the product instance and SSM On-Prem:
  - Schedule periodic synchronization between the product instance and SSM On-Prem, by configuring the reporting interval. Enter the **license smart usage interval** *interval_in_days* command in global configuration mode.

    To know when the product instance will be sending the next RUM report, enter the **show license all** command in privileged EXEC mode and in the output, check the `Next report push:` field.
  - Enter the **license smart sync** privileged EXEC command, for ad hoc or on-demand synchronization between the product instance and SSM On-Prem.

- To synchronize usage information with CSSM:
  - Schedule periodic synchronization with CSSM. In the SSM On-Prem UI, navigate to **Reports** > **Usage Schedules** > **Synchronization schedule with Cisco**. Enter the following frequency information and save:
    - **Days**: Refers to how *often* synchronization occurs. For example, if you enter 2, synchronization occurs once every two days.
    - **Time of Day:**: Refers to the time at which synchronization occurs, in the 24-hour notation system. For example, if you enter 14 hours and 0 minutes, synchronization occurs at 2 p.m. (1400) in your local time zone.
  - Upload and download the required files for reporting: Exporting and Importing Usage Data (SSM On-Prem UI), on page 99.



CHAPTER 5

Task Library for Smart Licensing Using Policy

This section is a grouping of tasks that apply to Smart Licensing Using Policy. It includes tasks performed on a product instance, on the CSLU interface, and on the CSSM Web UI.

To implement a particular topology, refer to the corresponding workflow to know the sequential order of tasks that apply. See Implementing Smart Licensing Using Policy, on page 27.

To perform any additional configuration tasks, for instance, to configure a different license, or use an add-on license, or to configure a narrower reporting interval, refer to the corresponding task here. Check the "Supported Topologies" where provided, before you proceed.

Logging into Cisco (CSLU Interface)

Depending on your needs, when working in CSLU, you can either be in connected or disconnected mode. To work in the connected mode, complete these steps to connect with Cisco.

Step 1 From the CSLU Main screen, click **Login to Cisco** (located at the top right corner of the screen).

Step 2 Enter: **CCO User Name** and **CCO Password**.

Step 3 In the CSLU Preferences tab, check that the Cisco connectivity toggle displays “Cisco Is Available”.

Configuring a Smart Account and a Virtual Account (CSLU Interface)

Both the Smart Account and Virtual Account are configured through the Preferences tab. Complete the following steps to configure both Smart and Virtual Accounts for connecting to Cisco.

Step 1 Select the **Preferences Tab** from the CSLU home screen.

Step 2 Perform these steps for adding both a Smart Account and Virtual Account:

a) In the Preferences screen navigate to the **Smart Account** field and add the **Smart Account Name**.

b) Next, navigate to the **Virtual Account** field and add the **Virtual Account Name**.

If you are connected to Cisco SSM (In the Preferences tab, **Cisco is Available**), you can select from the list of available SA/VAs.

If you are not connected to Cisco SSM (In the Preferences tab, **Cisco Is Not Available**), enter the SA/VAs manually.

Note SA/VA names are case sensitive.

Step 3 Click **Save**. The SA/VA accounts are saved to the system

Only one SA/VA pair can reside on CSLU at a time. You cannot add multiple accounts. To change to another SA/VA pair, repeat Steps 2a and 2b then Save. A new SA/VA account pair replaces the previous saved pair

Adding a Product-Initiated Product Instance in CSLU (CSLU Interface)

Complete these steps to add a device-created Product Instance using the Preferences tab.

Step 1 Click the **Preferences** tab.

Step 2 In the Preferences screen, de-select the **Validate Device** check box.

Step 3 Set the **Default Connect Method** to **Product Instance Initiated** and then click **Save**.

Ensuring Network Reachability for Product Instance-Initiated Communication

This task provides *possible* configurations that may be required to ensure network reachability for product instance-initiated communication. Steps marked as "(Required)" are required for all product instances, all other steps my be required or optional, depending the kind of product instance and network requirements. Configure the applicable commands:

Before you begin

Supported topologies: Connected to Cisco SSM Through CSLU (product instance-initiated communication).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-type-number*
4. **vrf forwarding** *vrf-name*
5. **ip address** *ip-address mask*
6. **negotiation auto**
7. **end**
8. **ip http client source-interface** *interface-type-number*
9. **ip route** *ip-address ip-mask subnet mask*
10. {**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*]
11. **ip domain lookup source-interface** *interface-type-number*
12. **ip domain name** *domain-name*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-type-number* **Example:** `Device (config)# interface gigabitethernet0/0`	Enters interface configuration mode and specifies the Ethernet interface, subinterface, or VLAN to be associated with the VRF.
Step 4	**vrf forwarding** *vrf-name* **Example:** `Device(config-if)# vrf forwarding Mgmt-vrf`	Associates the VRF with the Layer 3 interface. This command activates multiprotocol VRF on an interface
Step 5	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 192.168.0.1 255.255.0.0`	Defines the IP address for the VRF.
Step 6	**negotiation auto** **Example:** `Device(config-if)# negotiation auto`	Enables auto-negotiation operation for the speed and duplex parameters of an interface.
Step 7	**end** **Example:** `Device(config-if)# end`	Exits the interface configuration mode and enters global configuration mode.
Step 8	**ip http client source-interface** *interface-type-number* **Example:** `Device(config)# ip http client source-interface gigabitethernet0/0`	Configures a source interface for the HTTP client.
Step 9	**ip route** *ip-address ip-mask subnet mask* **Example:** `Device(config)# ip route vrf mgmt-vrf 192.168.0.1 255.255.0.0 192.168.255.1`	(Required) Configures a route and gateway on the product instance. You can configure either a static route or a dynamic route.
Step 10	{**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*] **Example:** `Device(config)# Device(config)# ip name-server vrf mgmt-vrf 173.37.137.85`	Configures Domain Name System (DNS) on the VRF interface.

	Command or Action	Purpose
Step 11	**ip domain lookup source-interface** *interface-type-number* **Example:** `Device(config)# ip domain lookup source-interface gigabitethernet0/0`	Configures the source interface for the DNS domain lookup. **Note** If you configure this command on a Layer 3 physical interface, it is automatically removed from running configuration in case the port mode is changed or if the device reloads. The only available workaround is to reconfigure the command. Starting with Cisco IOS XE Dublin 17.12.1, this issue is resolved.
Step 12	**ip domain name** *domain-name* **Example:** `Device(config)# ip domain name example.com`	Configure DNS discovery of your domain. In accompanying example, the name-server creates entry `cslu-local.example.com`.

Adding a CSLU-Initiated Product Instance in CSLU (CSLU Interface)

Using the CSLU interface, you can configure the connect method to be CSLU Initiated. This connect method (mode) enables CSLU to retrieve product instance information.

Note The default Connect Method is set in the **Preferences** tab.

Complete these steps to add a Product Instance from the Inventory tab

Step 1 Go to the **Inventory** tab and from the Product Instances table, select **Add Single Product**.

Step 2 Enter the **Host** (IP address of the host).

Step 3 Select the **Connect Method** and select an appropriate CSLU Initiated connect method.

Step 4 In the right panel, click **Product Instance Login Credentials**. The left panel of the screen changes to show the User Name and Password fields

Step 5 Enter the product instance **User Name** and **Password**.

Step 6 Click **Save**.

The information is saved to the system and the device is listed in the Product Instances table with the Last Contact listed as never.

Collecting Usage Reports: CSLU Initiated (CSLU Interface)

CSLU also allows you to manually trigger the gathering of usage reports from devices.

After configuring and selecting a product instance (selecting **Add Single Product Instance**, filling in the host name and selecting a CSLU Initiated connect method), select **Actions for Selected** > **Collect Usage**. CSLU connects to the selected product instances and collects usage reports. These usage reports are stored in CSLU's local library. These reports can then be transferred to Cisco if CSLU is connected to Cisco, or (if you are not connected to Cisco) you can manually trigger usage collection by selecting **Data** > **Export to Cisco SSM**.

If you are working in CSLU-initiated mode, complete these steps to configure CSLU to collect RUM reports from Product Instances.

Step 1 Click the **Preferences** tab and enter a valid Smart Account and Virtual Account, and then select an appropriate CSLU Initiated collect method. (If there have been any changes in Preferences, make sure you click **Save**.)

Step 2 Click the **Inventory** tab and select one or more product instances.

Step 3 Click **Actions for Selected** > **Collect Usage**

RUM reports are retrieved from each selected device and stored in the CSLU local library. The Last Contact column is updated to show the time the report was received, and the Alerts column shows the status.

If CSLU is currently logged into Cisco the reports will be automatically sent to the associated Smart Account and Virtual Account in Cisco and Cisco will send an acknowledgement to CSLU as well as to the product instance. The acknowledgement will be listed in the alerts column of the Product Instance table.

To manually transfer usage reports Cisco, from the CSLU main screen select **Data** > **Export to Cisco SSM**.

Step 4 From the **Export to Cisco SSM** modal, you can select the local directory where the reports are to be stored. (<CSLU_WORKING_Directory>/data/default/rum/unsent)

At this point, the usage reports are saved in your local directory (library). To upload these usage reports to Cisco, follow the steps described in Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124.

Note The Windows operating system can change the behavior of a usage report file properties by dropping the extension when that file is renamed. The behavior change happens when you rename the downloaded file and the renamed file drops the extension. For example, the downloaded default file named `UD_xxx.tar` is renamed to `UD_yyy`. The file loses its TAR extension and cannot function. To enable the usage file to function normally, after re-naming a usage report file, you must also add the TAR extension back to the file name, for example `UD_yyy.tar`.

Export to Cisco SSM (CSLU Interface)

This option can be used as a part of a manual download procedure when you want the workstation isolated for security purposes.

Step 1 Go to the **Preferences** tab, and turn off the **Cisco Connectivity** toggle switch.

The field switches to "Cisco Is Not Available".

Step 2 From the CSLU home screen, navigate to **Data** > **Export to Cisco SSM**.

Step 3 Select the file from the modal that opens and click **Save**. You now have the file saved.

Note At this point you have a DLC file, RUM file, or both.

Step 4 From a workstation that has connectivity to Cisco, and complete the following: Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124

Once the file is downloaded, you can import it into CSLU. See: Import from Cisco SSM (CSLU Interface), on page 81

Import from Cisco SSM (CSLU Interface)

Once you have received the ACK or other file (such as an authorization code) from Cisco, you are ready to upload that file to your system. This procedure can be used for workstations that are offline. Complete these steps to select and upload files from Cisco.

Step 1 Ensure that you have downloaded the file to a location that is accessible to CSLU.

Step 2 From the CSLU home screen, navigate to **Data** > **Import from Cisco SSM**.

Step 3 An Import from Cisco SSM modal open for you to either:

- Drag and Drop a **File** that resides on your local drive, or
- Browse for the appropriate *.xml file, select the file and click **Open**.

If the upload is successful, you will get a message indicating that the file was successfully sent to the server. If the upload is not successful, you will get an import error.

Step 4 When you have finished uploading, click the **x** at the top right corner of the modal to close it.

Ensuring Network Reachability for CSLU-Initiated Communication

This task provides *possible* configurations that may be required to ensure network reachability for CSLU-initiated communication. Steps marked as "(Required)" are required for all product instances, all other steps may be required or optional, depending the kind of product instance and network requirements. Configure the applicable commands:

Before you begin

Supported topologies: Connected to Cisco SSM Through CSLU (CSLU-initiated communication).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **aaa new model**
4. **aaa authentication login default local**
5. **aaa authorization exec default local**
6. ip routing

7. {**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*]
8. **ip domain lookup source-interface** *interface-type-number*
9. **ip domain name** *name*
10. **no username** *name*
11. **username** *name* **privilege** *level* **password** *password*
12. **interface** *interface-type-number*
13. **vrf forwarding** *vrf-name*
14. **ip address** *ip-address mask*
15. **negotiation auto**
16. **no shutdown**
17. **end**
18. **ip http server**
19. **ip http authentication local**
20. **ip http secure-server**
21. **ip http max-connections**
22. **ip tftp source-interface** *interface-type-number*
23. **ip route** *ip-address ip-mask subnet mask*
24. **logging host**
25. **end**
26. **show ip http server session-module**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**aaa new model** **Example:** `Device(config)# aaa new model`	(Required) Enable the authentication, authorization, and accounting (AAA) access control model.
Step 4	**aaa authentication login default local** **Example:** `Device(config)# aaa authentication login default local`	(Required) Sets AAA authentication to use the local username database for authentication.
Step 5	**aaa authorization exec default local** **Example:** `Device(config)# aaa authorization exec default local`	Sets the parameters that restrict user access to a network. The user is allowed to run an EXEC shell.

	Command or Action	Purpose
Step 6	ip routing **Example:** `Device(config)# ip routing`	Enables IP routing.
Step 7	{**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*] **Example:** `Device(config)# ip name-server vrf Mgmt-vrf 192.168.1.100 192.168.1.200 192.168.1.300`	(Optional) Specifies the address of one or more name servers to use for name and address resolution. You can specify up to six name servers. Separate each server address with a space. The first server specified is the primary server. The device sends DNS queries to the primary server first. If that query fails, the backup servers are queried.
Step 8	**ip domain lookup source-interface** *interface-type-number* **Example:** `Device(config)# ip domain lookup source-interface gigabitethernet0/0`	Enables DNS-based hostname-to-address translation on your device. This feature is enabled by default. If your network devices require connectivity with devices in networks for which you do not control name assignment, you can dynamically assign device names that uniquely identify your devices by using the global Internet naming scheme (DNS). **Note** If you configure this command on a Layer 3 physical interface, it is automatically removed from running configuration in case the port mode is changed or if the device reloads. The only available workaround is to reconfigure the command. Starting with Cisco IOS XE Dublin 17.12.1, this issue is resolved.
Step 9	**ip domain name** *name* **Example:** `Device(config)# ip domain name vrf Mgmt-vrf cisco.com`	Defines a default domain name that the software uses to complete unqualified hostnames (names without a dotted-decimal domain name).
Step 10	**no username** *name* **Example:** `Device(config)# no username admin`	(Required) Clears the specified username, if it exists. For *name* , enter the same username you will create in the next step. This ensures that a duplicate of the username you are going to create in the next step does not exist. If you plan to use REST APIs for CSLU-initiated retrieval of RUM reports, you have to log in to CSLU. Duplicate usernames may cause the feature to work incorrectly if there are duplicate usernames in the system.
Step 11	**username** *name* **privilege** *level* **password** *password* **Example:** `Device(config)# username admin privilege 15 password 0 lab`	(Required) Establishes a username-based authentication system. The **privilege** keyword sets the privilege level for the user. A number between 0 and 15 that specifies the privilege level for the user.

	Command or Action	Purpose
		The password allows access to the name argument. A password must be from 1 to 25 characters, can contain embedded spaces, and must be the last option specified in the **username** command. This enables CSLU to use the product instance native REST. **Note** Enter this username and password in CSLU (Collecting Usage Reports: CSLU Initiated (CSLU Interface), on page 79 → *Step 4. f.* CSLU can then collect RUM reports from the product instance.
Step 12	**interface** *interface-type-number* **Example:** `Device (config)# interface gigabitethernet0/0`	Enters interface configuration mode and specifies the Ethernet interface, subinterface, or VLAN to be associated with the VRF.
Step 13	**vrf forwarding** *vrf-name* **Example:** `Device(config-if)# vrf forwarding Mgmt-vrf`	Associates the VRF with the Layer 3 interface. This command activates multiprotocol VRF on an interface
Step 14	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 192.168.0.1 255.255.0.0`	Defines the IP address for the VRF.
Step 15	**negotiation auto** **Example:** `Device(config-if)# negotiation auto`	Enables auto-negotiation operation for the speed and duplex parameters of an interface.
Step 16	**no shutdown** **Example:** `Device(config-if)# no shutdown`	Restarts a disabled interface.
Step 17	**end** **Example:** `Device(config-if)# end`	Exits the interface configuration mode and enters global configuration mode.
Step 18	**ip http server** **Example:** `Device(config)# ip http server`	(Required) Enables the HTTP server on your IP or IPv6 system, including a Cisco web browser user interface. The HTTP server uses the standard port 80, by default.

Step 19	**ip http authentication local**
	Example:
	`ip http authentication local`
	`Device(config)#`
		(Required) Specifies a particular authentication method for HTTP server users.
		The **local** keyword means that the login user name, password and privilege level access combination specified in the local system configuration (by the username global

	Command or Action	Purpose
		configuration command) should be used for authentication and authorization.
Step 20	**ip http secure-server** **Example:** `Device(config)# ip http server`	(Required) Enables a secure HTTP (HTTPS) server. The HTTPS server uses the Secure Sockets Layer (SSL) version 3.0 protocol.
Step 21	**ip http max-connections** **Example:** `Device(config)# ip http max-connections 16`	(Required) Configures the maximum number of concurrent connections allowed for the HTTP server. Enter an integer in the range from 1 to 16. The default is 5.
Step 22	**ip tftp source-interface** *interface-type-number* **Example:** `Device(config)# ip tftp source-interface GigabitEthernet0/0`	Specifies the IP address of an interface as the source address for TFTP connections.
Step 23	**ip route** *ip-address ip-mask subnet mask* **Example:** `Device(config)# ip route vrf mgmt-vrf 192.168.0.1 255.255.0.0 192.168.255.1`	Configures a route and gateway on the product instance. You can configure either a static route or a dynamic route.
Step 24	**logging host** **Example:** `Device(config)# logging host 172.25.33.20 vrf Mgmt-vrf`	Logs system messages and debug output to a remote host.
Step 25	**end** **Example:** `Device(config)# end`	Exits the global configuration mode and enters priveleged EXEC mode.
Step 26	**show ip http server session-module** **Example:** `Device# show ip http server session-module`	(Required) Verifies HTTP connectivity. In the output, check that `SL_HTTP` is active. Additionally, you can also perform the following checks : • From device where CSLU is installed, verify that you can ping the product instance. A successful ping confirms that the product instance is reachable. • From a Web browser on the device where CSLU is installed verify `https://<product-instance-ip>/`. This ensures that the REST API from CSLU to the product instance works as expected.

Requesting SLAC for One or More Product Instance (CSLU Interface)

This task shows you how to manually request SLAC for one or more product instances in CSLU.

Before you begin

Supported topologies:

- Connected to Cisco SSM Through CSLU (Product instance-initiated and CSLU-initiated)
- CSLU Disconnected from Cisco SSM (Product instance-initiated and CSLU-initiated)

Step 1 Navigate to the **Inventory** tab. From the Product Instance table, select the one or more product instances for authorization code request.

Step 2 From the **Actions for Selected** menu, select the **Authorization Code Request** option.

The **Authorization Request Information** modal pops up.

Step 3 Click **Accept**.

Another modal opens to select a local .csv file for uploading.

Step 4 Upload the file to Cisco SSM, generate authorization codes and download the file containing the codes. See Generating and Downloading SLAC from Cisco SSM to a File, on page 113.

Step 5 Return to the CSLU interface.

Step 6 Apply the authorization codes by selecting **Data** > **Import from Cisco SSM**. See Import from Cisco SSM (CSLU Interface), on page 81

If CSLU is in the product instance-initiated mode: The uploaded codes are applied to the product instance the next time the product instance contacts CSLU.

If CSLU is in the CSLU-initiated mode: The uploaded codes are now applied to the product instance the next time the CSLU runs an update.

Setting Up a Connection to Cisco SSM

The following steps show how to set up a Layer 3 connection to Cisco SSM to verify network reachability. Steps marked as "(Required)" are required for all product instances, all other steps may be required or optional, depending the kind of product instance and network requirements. Configure the applicable commands:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. {**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*]

4. **ip name-server vrf Mgmt-vrf** *server-address 1...server-address 6*
5. **ip domain lookup source-interface** *interface-type interface-number*
6. **ip domain name** *domain-name*
7. **ip host tools.cisco.com** *ip-address*
8. **interface** *interface-type-number*
9. **ntp server** *ip-address* [**version** *number*] [**key** *key-id*] [**prefer**]
10. **switchport access vlan** *vlan_id*
11. **ip route** *ip-address ip-mask subnet mask*
12. **ip http client source-interface** *interface-type-number*
13. **exit**
14. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	{**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*] **Example:** `Device(config)# ip name-server 209.165.201.1 209.165.200.225 209.165.201.14 209.165.200.230`	Specifies the address of one or more name servers to use for name and address resolution. You can specify up to six name servers. Separate each server address with a space. The first server specified is the primary server. The device sends DNS queries to the primary server first. If that query fails, the backup servers are queried.
Step 4	**ip name-server vrf Mgmt-vrf** *server-address 1...server-address 6* **Example:** `Device(config)# ip name-server vrf Mgmt-vrf 209.165.201.1 209.165.200.225 209.165.201.14 209.165.200.230`	(Optional) Configures DNS on the VRF interface. You can specify up to six name servers. Separate each server address with a space. **Note** This command is an alternative to the **ip name-server** command.
Step 5	**ip domain lookup source-interface** *interface-type interface-number* **Example:** `Device(config)# ip domain lookup source-interface Vlan100`	Configures the source interface for the DNS domain lookup.
Step 6	**ip domain name** *domain-name* **Example:** `Device(config)# ip domain name example.com`	Configures the domain name.

	Command or Action	Purpose
Step 7	**ip host tools.cisco.com** *ip-address* **Example:** `Device(config)# ip host tools.cisco.com 209.165.201.30`	Configures static hostname-to-address mappings in the DNS hostname cache if automatic DNS mapping is not available.

Step 8	**interface** *interface-type-number*
	Example:
	`Device(config)# interface Vlan100`
	`Device(config-if)# ip address 192.0.2.10 255.255.255.0`
	`Device(config-if)# exit`
		Configures a Layer 3 interface. Enter an interface type and number or a VLAN.

Step 9	**ntp server** *ip-address* [**version** *number*] [**key** *key-id*] [**prefer**] **Example:** `Device(config)# ntp server 198.51.100.100 version 2 prefer`	(Required) Activates the NTP service (if it has not already been activated) and enables the system to synchronize the system software clock with the specified NTP server. This ensures that the device time is synchronized with Cisco SSM. Use the **prefer** keyword if you need to use this command multiple times and you want to set a preferred server. Using this keyword reduces switching between servers.

Step 10	**switchport access vlan** *vlan_id*
	Example:
	`Device(config)# interface GigabitEthernet1/0/1`
	`Device(config-if)# switchport access vlan 100`
	`Device(config-if)# switchport mode access`
	`Device(config-if)# exit`
	`OR`
	`Device(config)#`
		Enables the VLAN for which this access port carries traffic and sets the interface as a nontrunking nontagged single-VLAN Ethernet interface.
		Note This step is to be configured only if the switchport access mode is required. The **switchport access vlan** command may apply to Catalyst switching product instances, for example, and for routing product instances you may want to configure the **ip address** *ip-address mask* command instead.

Step 11	**ip route** *ip-address ip-mask subnet mask* **Example:** `Device(config)# ip route 192.0.2.0 255.255.255.255 192.0.2.1`	Configures a route on the device. You can configure either a static route or a dynamic route.
Step 12	**ip http client source-interface** *interface-type-number* **Example:** `Device(config)# ip http client source-interface Vlan100`	(Required) Configures a source interface for the HTTP client. Enter an interface type and number or a VLAN.
Step 13	**exit** **Example:** `Device(config)# exit`	Exits global configuration mode and returns to privileged EXEC mode.
Step 14	**copy running-config startup-config** **Example:**	Saves your entries in the configuration file.

	Command or Action	Purpose
	`Device# copy running-config startup-config`	

Configuring Smart Transport Through an HTTPs Proxy

To use a proxy server to communicate with CSSM when using the Smart transport mode, complete the following steps:

Note *Authenticated* HTTPs proxy configurations are not supported.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **license smart transport smart**
4. **license smart url default**
5. **license smart proxy** {**address** *address_hostname* | **port** *port_num*}
6. **exit**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**license smart transport smart** **Example:** `Device(config)# license smart transport smart`	Enables Smart transport mode.
Step 4	**license smart url default** **Example:** `Device(config)# license smart transport default`	Automatically configures the Smart URL (https://smartreceiver.cisco.com/licservice/license). For this option to work as expected, the transport mode in the previous step must be configured as **smart**.
Step 5	**license smart proxy** {**address** *address_hostname* | **port** *port_num*} **Example:**	Configures a proxy for the Smart transport mode. When a proxy is configured, licensing messages are sent to the proxy along with the final destination URL (CSSM). The proxy

	Command or Action	Purpose
	`Device(config)# license smart proxy address 192.168.0.1` `Device(config)# license smart proxy port 3128`	sends the message on to CSSM. Configure the proxy address and port number separately: • **address** *address_hostname*: Specifies the proxy address. Enter the IP address or hostname of the proxy server. • **port** *port_num*: Specifies the proxy port. Enter the proxy port number. Note the change in the criteria for the acceptance of proxy servers, starting with Cisco IOS XE Bengaluru 17.6.1: only the status code of the proxy server response is verified by the system and not the reason phrase. The RFC format is `status-line = HTTP-version SP status-code SP reason-phrase CRLF`. For more information about the status line, see section 3.1.2 of RFC 7230.
Step 6	**exit** **Example:** `Device(config)# exit`	Exits global configuration mode and returns to privileged EXEC mode.
Step 7	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	Saves your entries in the configuration file.

Configuring the Call Home Service for Direct Cloud Access

The Call Home service provides email-based and web-based notification of critical system events to Cisco SSM. To configure the transport mode, enable the Call Home service, and configure a destination profile (A destination profile contains the required delivery information for an alert notification. At least one destination profile is required.), complete the following steps:

Note All steps are required unless specifically called-out as "(Optional)".

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **license smart transport callhome**
4. **license smart url** *url*
5. **service call-home**
6. **call-home**
7. **contact-email-address** *email-address*
8. **profile** *name*

9. **active**
10. **destination transport-method http**{**email** |**http**}
11. **destination address** { **email** *email_address* |**http** *url*}
12. **exit**
13. **exit**
14. **copy running-config startup-config**
15. **show call-home profile** {*name* |**all**}

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**license smart transport callhome** **Example:** `Device(config)# license smart transport callhome`	Enables Call Home as the transport mode.
Step 4	**license smart url** *url* **Example:** `Device(config)# license smart url https://tools.cisco.com/its/service/oddce/services/DDCEService`	For the **callhome** transport mode, configure the Cisco SSM URL exactly as shown in the example.
Step 5	**service call-home** **Example:** `Device(config)# service call-home`	Enables the Call Home feature.
Step 6	**call-home** **Example:** `Device(config)# call-home`	Enters Call Home configuration mode.
Step 7	**contact-email-address** *email-address* **Example:** `Device(config-call-home)# contact-email-addr username@example.com`	Assigns customer's email address and enables Smart Call Home service full reporting capability and sends a full inventory message from Call-Home TAC profile to Smart Call Home server to start full registration process. You can enter up to 200 characters in email address format with no spaces.

Step 8	**profile** *name*
	Example:
	`Device(config-call-home)# profile CiscoTAC-1`
	`Device(config-call-home-profile)#`
		Enters the Call Home destination profile configuration submode for the specified destination profile.
		By default:

	Command or Action	Purpose
		• The CiscoTAC-1 profile is inactive. To use this profile with the Call Home service, you must enable the profile. • The CiscoTAC-1 profile sends a full report of all types of events subscribed in the profile. The alternative is to additionally configure `Device(cfg-call-home-profile)# anonymous-reporting-only` anonymous-reporting-only. When this is set, only crash, inventory, and test messages will be sent. Use the **show call-home profile all** command to check the profile status.
Step 9	**active** **Example:** `Device(config-call-home-profile)# active`	Enables the destination profile.

Step 10	**destination transport-method http**{**email** |**http**}
	Example:
	`Device(config-call-home-profile)# destination transport-method http`
	AND
	`Device(config-call-home-profile)# no destination transport-method email`
		Enables the message transport method. In the example, Call Home service is enabled via HTTP and transport via email is disabled.
		The **no** form of the command disables the method.

Step 11	**destination address** { **email** *email_address* |**http** *url*}
	Example:
	`Device(config-call-home-profile)# destination address http https://tools.cisco.com/its/service/oddce/services/DDCEService`
	AND
	`Device(config-call-home-profile)# no destination address http https://tools.cisco.com/its/service/oddce/services/DDCEService`
		Configures the destination e-mail address or URL to which Call Home messages are sent. When entering a destination URL, include either **http://** (default) or **https://**, depending on whether the server is a secure server.
		In the example provided here, a **http://** destination URL is configured; and the **no** form of the command is configured for **https://**.

Step 12	**exit** **Example:** `Device(config-call-home-profile)# exit`	Exits Call Home destination profile configuration mode and returns to Call Home configuration mode.
Step 13	**exit** **Example:** `Device(config-call-home)# end`	Exits Call Home configuration mode and returns to privileged EXEC mode.
Step 14	**copy running-config startup-config** **Example:**	Saves your entries in the configuration file.

	Command or Action	Purpose
	`Device# copy running-config startup-config`	
Step 15	**show call-home profile** {*name* |**all**}	Displays the destination profile configuration for the specified profile or all configured profiles.

Configuring the Call Home Service for Direct Cloud Access through an HTTPs Proxy Server

The Call Home service can be configured through an HTTPs proxy server. This configuration requires no user authentication to connect to Cisco SSM.

Note Authenticated HTTPs proxy configurations are not supported.

To configure and enable the Call Home service through an HTTPs proxy, complete the following steps:

Note All steps are required unless specifically called-out as "(Optional)".

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **license smart transport callhome**
4. **service call-home**
5. **call-home**
6. **http-proxy** *proxy-address* **proxy-port** *port-number*
7. **exit**
8. **exit**
9. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**license smart transport callhome** **Example:** `Device(config)# license smart transport callhome`	Enables Call Home as the transport mode.
Step 4	**service call-home** **Example:** `Device(config)# service call-home`	Enables the Call Home feature.
Step 5	**call-home** **Example:** `Device(config)# call-home`	Enters Call Home configuration mode.
Step 6	**http-proxy** *proxy-address* **proxy-port** *port-number* **Example:** `Device(config-call-home)# http-proxy 198.51.100.10 port 5000`	Configures the proxy server information to the Call Home service.
Step 7	**exit** **Example:** `Device(config-call-home)# exit`	Exits Call Home configuration mode and enters global configuration mode. Note the change in the criteria for the acceptance of proxy servers, starting with Cisco IOS XE Bengaluru 17.6.1: only the status code of the proxy server response is verified by the system and not the reason phrase. The RFC format is `status-line = HTTP-version SP status-code SP reason-phrase CRLF`. For more information about the status line, see section 3.1.2 of RFC 7230.
Step 8	**exit** **Example:** `Device(config)# exit`	Exits global configuration mode and enters privileged EXEC mode.
Step 9	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	Saves your entries in the configuration file.

Assigning a Smart Account and Virtual Account (SSM On-Prem UI)

You can use this procedure to import one or more product instances along with corresponding Smart Account and Virtual Account information, into the SSM On-Prem database. This enables SSM On-Prem to map product instances that are part of local virtual accounts (other than the default local virtual account), to the correct license pool in Cisco SSM:

Before you begin

Supported topologies: SSM On-Prem Deployment (product instance-initiated communication).

Step 1 Log into the SSM On-Prem and select the **Smart Licensing** workspace.

Step 2 Navigate to **Inventory** > **SL Using Policy** > **Export/Import All** > **Import Product Instances List**

The **Upload Product Instances** window is displayed.

Step 3 Click **Download** to download the .csv template file and enter the required information for all the product instances in the template.

Step 4 Once you have filled-out the template, click **Inventory** > **SL Using Policy** > **Export/Import All** > **Import Product Instances List**.

The **Upload Product Instances** window is displayed.

Step 5 Now, click **Browse** and upload the filled-out .csv template.

Smart Account and Virtual Account information for all uploaded product instances is now available in SSM On-Prem.

Validating Devices (SSM On-Prem UI)

When device validation is enabled, RUM reports from an unknown product instance (not in the SSM On-Prem database) are rejected.

By default, devices are not validated. Complete the following steps to enable the function:

Before you begin

Supported topologies: SSM On-Prem Deployment (product instance-initiated communication).

Step 1 In the **On-Prem License Workspace** window, click **Admin Workspace** and log in, if prompted.

The **On-Prem Admin Workspace** window is displayed.

Step 2 Click the **Settings** widget.

The **Settings** window is displayed.

Step 3 Navigate to the **CSLU** tab and turn-on the **Validate Device** toggle switch.

RUM reports from an unknown product instance will now be rejected. If you haven't already, you must now add the required product instances to the SSM On-Prem database before sending RUM reports. See Assigning a Smart Account and Virtual Account (SSM On-Prem UI), on page 94.

Ensuring Network Reachability for Product Instance-Initiated Communication

This task provides *possible* configurations that may be required to ensure network reachability for product instance-initiated communication. Steps marked as "(Required)" are required for all product instances, all other steps my be required or optional, depending the kind of product instance and network requirements. Configure the applicable commands:

Note Ensure that you configure steps 13, 14, and 15 exactly as shown below. These commands must be configured to ensure that the correct trustpoint is used and that the necessary certificates are accepted for network reachability.

Before you begin

Supported topologies: SSM On-Prem Deployment (product instance-initiated communication).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-type-number*
4. **vrf forwarding** *vrf-name*
5. **ip address** *ip-address mask*
6. **negotiation auto**
7. **end**
8. **ip http client source-interface** *interface-type-number*
9. **ip route** *ip-address ip-mask subnet mask*
10. {**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*]
11. **ip domain lookup source-interface** *interface-type-number*
12. **ip domain name** *domain-name*
13. **crypto pki trustpoint SLA-TrustPoint**
14. enrollment terminal
15. **revocation-check none**
16. **exit**
17. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *interface-type-number* **Example:** `Device (config)# interface gigabitethernet0/0`	Enters interface configuration mode and specifies the Ethernet interface, subinterface, or VLAN to be associated with the VRF.
Step 4	**vrf forwarding** *vrf-name* **Example:** `Device(config-if)# vrf forwarding Mgmt-vrf`	Associates the VRF with the Layer 3 interface. This command activates multiprotocol VRF on an interface
Step 5	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 192.168.0.1 255.255.0.0`	Defines the IP address for the VRF.
Step 6	**negotiation auto** **Example:** `Device(config-if)# negotiation auto`	Enables auto-negotiation operation for the speed and duplex parameters of an interface.
Step 7	**end** **Example:** `Device(config-if)# end`	Exits the interface configuration mode and enters global configuration mode.
Step 8	**ip http client source-interface** *interface-type-number* **Example:** `Device(config)# ip http client source-interface gigabitethernet0/0`	Configures a source interface for the HTTP client.
Step 9	**ip route** *ip-address ip-mask subnet mask* **Example:** `Device(config)# ip route vrf mgmt-vrf 192.168.0.1 255.255.0.0 192.168.255.1`	(Required) Configures a route and gateway on the product instance. You can configure either a static route or a dynamic route.
Step 10	{**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*] **Example:** `Device(config)# Device(config)# ip name-server vrf mgmt-vrf 198.51.100.1`	Configures Domain Name System (DNS) on the VRF interface.
Step 11	**ip domain lookup source-interface** *interface-type-number* **Example:**	Configures the source interface for the DNS domain lookup.

	Command or Action	Purpose
	`Device(config)# ip domain lookup source-interface gigabitethernet0/0`	**Note** If you configure this command on a Layer 3 physical interface, it is automatically removed from running configuration in case the port mode is changed or if the device reloads. The only available workaround is to reconfigure the command. Starting with Cisco IOS XE Dublin 17.12.1, this issue is resolved.
Step 12	**ip domain name** *domain-name* **Example:** `Device(config)# ip domain name example.com`	Configure DNS discovery of your domain. In the accompanying example, the name-server creates entry `cslu-local.example.com`.

Step 13	**crypto pki trustpoint SLA-TrustPoint**
	Example:
	`Device(config)# crypto pki trustpoint SLA-TrustPoint`
	`Device(ca-trustpoint)#`
		(Required) Declares that the product instance should use trustpoint "SLA-TrustPoint" and enters the ca-trustpoint configuration mode. The product instance does not recognize any trustpoints until you declare a trustpoint using this command.

Step 14	enrollment terminal **Example:** `Device(ca-trustpoint)# enrollment terminal`	(Required) Specifies the certificate enrollment method.
Step 15	**revocation-check none** **Example:** `Device(ca-trustpoint)# revocation-check none`	(Required) Specifes a method that is to be used to ensure that the certificate of a peer is not revoked. For the SSM On-Prem Deployment topology, enter the **none** keyword. This means that a revocation check will not be performed and the certificate will always be accepted.

Step 16	**exit**
	Example:
	`Device(ca-trustpoint)# exit`
	`Device(config)# exit`
		Exits the ca-trustpoint configuration mode and then the global configuration mode and returns to privileged EXEC mode.

Step 17	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	Saves your entries in the configuration file.

Retrieving the Transport URL (SSM On-Prem UI)

You must configure the transport URL on the product instance when you deploy product instance-initiated communication in an SSM On-Prem deployment. This task shows you how to easily copy the complete URL including the tenant ID from SSM On-Prem.

Before you begin

Supported topologies: SSM On-Prem Deployment (product instance-initiated communication).

Step 1 Log into SSM On-Prem and select the **Smart Licensing** workspace.

Step 2 Navigate to the **Inventory** tab and from the dropdown list of local virtual accounts (top right corner), select the *default local virtual account*. When you do, the area under the **Inventory** tab displays **Local Virtual Account: Default**.

Step 3 Navigate to the **General** tab.

The **Product Instance Registration Tokens** area is displayed.

Step 4 In the **Product Instance Registration Tokens** area click **CSLU Transport URL**.

The **Product Registration URL** pop-window is displayed.

Step 5 Copy the entire URL and save it in an accessible place.

You will require the URL when you configure the transport type and URL on the product instance.

Step 6 Configure the transport type and URL. See: Setting the Transport Type, URL, and Reporting Interval, on page 126.

Exporting and Importing Usage Data (SSM On-Prem UI)

You can use this procedure to complete usage synchronization between SSM On-Prem and Cisco SSM when SSM On-Prem is disconnected from Cisco SSM.

Before you begin

Supported topologies:

- SSM On-Prem Deployment (SSM On-Prem-initiated communication)
- SSM On-Prem Deployment (product instance-initiated communication).

Reporting data must be available in SSM On-Prem. You must have either pushed the nessary reporting data from the product instance to SSM On-Prem (product instance-initiated communication) or retrieved the necessary reporting data from the product instance (SSM On-Prem-initiated communication).

Step 1 Log into SSM On-Prem and select **Smart Licensing**.

Step 2 Navigate to **Inventory** > **SL Using Policy** tab.

Step 3 In the **SL Using Policy** tab area, click **Export/Import All...** > **Export Usage to Cisco**.

This generates one .tar file with *all* the usage reports available in the SSM On-Prem server.

Step 4 Complete this task in Cisco SSM: Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124.

At the end of this task you will have an ACK file to import into SSM On-Prem.

Step 5 Again navigate to the **Inventory** > **SL Using Policy** tab.

Step 6 In the **SL Using Policy** tab area, click **Export/Import All...** > **Import From Cisco** . Upload the .tar ACK file.

To verify ACK import, in the **SL Using Policy** tab area check the **Alerts** column of the corresponding product instance. The following message is displayed: Acknowledgement received from Cisco SSM.

Adding One or More Product Instances (SSM On-Prem UI)

You can use this procedure to add one product instance or to import and add multiple product instances. It enables SSM On-Prem to retrieve information from the product instance.

Before you begin

Supported topologies: SSM On-Prem Deployment (SSM On-Prem-initiated communication).

Step 1 Log into the SSM On-Prem UI and click **Smart Licensing**.

Step 2 Navigate to **Inventory** tab. Select a local virtual account from the drop-down list in the top right corner.

Step 3 Navigate to the **SL Using Policy** tab.

Step 4 Add a single product or import multiple product instances (*choose one*).

- **To add a single product instance**:
  - **a.** In the **SL Using Policy** tab area, click **Add Single Product**.
  - **b.** In the **Host** field, enter the IP address of the host (product instance).
  - **c.** From the **Connect Method** dropdown list, select an appropriate SSM On-Prem-initiated connect method.

    The available connect methods for SSM On-Prem-initiated communication are: NETCONF, RESTCONF, and REST API.
  - **d.** In the right panel, click **Product Instance Login Credentials**.

    The **Product Instance Login Credentials** window is displayed

    Note You need the login credentials only if a product instance requires a SLAC.
  - **e.** Enter the **User ID** and **Password**, and click **Save**.

    This is the same user ID and password that you configured as part of commands required to establish network reachability (Ensuring Network Reachability for SSM On-Prem-Initiated Communication, on page 101).

    Once validated, the product instance is displayed in the listing in the **SL Using Policy** tab area.

- **To import multiple product instances:**
  - **a.** In **SL Using Policy** tab, click **Export/Import All...** > **Import Product Instances List**.

    The **Upload Product Instances** window is displayed.
  - **b.** Click **Download** to download the predefined .csv template.
  - **c.** Enter the required information for all the product instances in the .csv template.

    In the template, ensure that you provide **Host**, **Connect Method** and **Login Credentials** for all product instances.

The available connect methods for SSM On-Prem-initiated communication are: NETCONF, RESTCONF, and REST API.

Login credentials refer to the user ID and password that you configured as part of commands required to establish network reachability (Ensuring Network Reachability for SSM On-Prem-Initiated Communication, on page 101).

d. Again navigate to **Inventory** > **SL Using Policy** tab. Click **Export/Import All....** > **Import Product Instances List**.

The **Upload Product Instances** window is displayed.

e. Now upload the filled-out .csv template.

Once validated, the product instances are displayed in the listing in the **SL Using Policy** tab.

Ensuring Network Reachability for SSM On-Prem-Initiated Communication

This task provides *possible* configurations that may be required to ensure network reachability for SSM On-Prem-initiated communication. Steps marked as "(Required)" are required for all product instances, all other steps may be required or optional, depending the kind of product instance and network requirements. Configure the applicable commands:

Note Ensure that you configure steps 25, 26, and 27 exactly as shown below. These commands must be configured to ensure that the correct trustpoint is used and that the necessary certificates are accepted for network reachability.

Before you begin

Supported topologies: SSM On-Prem Deployment (SSM On-Prem-initiated communication).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **aaa new model**
4. **aaa authentication login default local**
5. **aaa authorization exec default local**
6. ip routing
7. {**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*]
8. **ip domain lookup source-interface** *interface-type-number*
9. **ip domain name** *name*
10. **no username** *name*
11. **username** *name* **privilege** *level* **password** *password*

12. **interface** *interface-type-number*
13. **vrf forwarding** *vrf-name*
14. **ip address** *ip-address mask*
15. **negotiation auto**
16. **no shutdown**
17. **end**
18. **ip http server**
19. **ip http authentication local**
20. **ip http secure-server**
21. **ip http max-connections**
22. **ip tftp source-interface** *interface-type-number*
23. **ip route** *ip-address ip-mask subnet mask*
24. **logging host**
25. **crypto pki trustpoint SLA-TrustPoint**
26. enrollment terminal
27. **revocation-check none**
28. **end**
29. **show ip http server session-module**
30. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**aaa new model** **Example:** `Device(config)# aaa new model`	(Required) Enable the authentication, authorization, and accounting (AAA) access control model.
Step 4	**aaa authentication login default local** **Example:** `Device(config)# aaa authentication login default local`	(Required) Sets AAA authentication to use the local username database for authentication.
Step 5	**aaa authorization exec default local** **Example:** `Device(config)# aaa authorization exec default local`	Sets the parameters that restrict user access to a network. The user is allowed to run an EXEC shell.

	Command or Action	Purpose
Step 6	ip routing **Example:** `Device(config)# ip routing`	Enables IP routing.
Step 7	{**ip** | **ipv6**} **name-server** *server-address 1 ...server-address 6*] **Example:** `Device(config)# ip name-server vrf Mgmt-vrf 192.168.1.100 192.168.1.200 192.168.1.300`	(Optional) Specifies the address of one or more name servers to use for name and address resolution. You can specify up to six name servers. Separate each server address with a space. The first server specified is the primary server. The device sends DNS queries to the primary server first. If that query fails, the backup servers are queried.
Step 8	**ip domain lookup source-interface** *interface-type-number* **Example:** `Device(config)# ip domain lookup source-interface gigabitethernet0/0`	Enables DNS-based hostname-to-address translation on your device. This feature is enabled by default. If your network devices require connectivity with devices in networks for which you do not control name assignment, you can dynamically assign device names that uniquely identify your devices by using the global Internet naming scheme (DNS). **Note** If you configure this command on a Layer 3 physical interface, it is automatically removed from running configuration in case the port mode is changed or if the device reloads. The only available workaround is to reconfigure the command. Starting with Cisco IOS XE Dublin 17.12.1, this issue is resolved.
Step 9	**ip domain name** *name* **Example:** d `Device(config)# ip domain name vrf Mgmt-vrf cisco.com`	Defines a default domain name that the software uses to complete unqualified hostnames (names without a dotted-decimal domain name).
Step 10	**no username** *name* **Example:** `Device(config)# no username admin`	(Required) Clears the specified username, if it exists. For *name* , enter the same username you will create in the next step. This ensures that a duplicate of the username you are going to create in the next step does not exist. If you plan to use REST APIs for SSM On-Prem-initiated retrieval of RUM reports, you have to log in to SSM On-Prem. Duplicate usernames may cause the feature to work incorrectly if there are present in the system.
Step 11	**username** *name* **privilege** *level* **password** *password* **Example:**	(Required) Establishes a username-based authentication system.

	Command or Action	Purpose
	`Device(config)# username admin privilege 15 password 0 lab`	The **privilege** keyword sets the privilege level for the user. A number between 0 and 15 that specifies the privilege level for the user. The password allows access to the name argument. A password must be from 1 to 25 characters, can contain embedded spaces, and must be the last option specified in the **username** command. This enables SSM On-Prem to use the product instance native REST. **Note** Enter this username and password in SSM On-Prem (Adding One or More Product Instances (SSM On-Prem UI), on page 100). This enables SSM On-Prem to collect RUM reports from the product instance.
Step 12	**interface** *interface-type-number* **Example:** `Device (config)# interface gigabitethernet0/0`	Enters interface configuration mode and specifies the Ethernet interface, subinterface, or VLAN to be associated with the VRF.
Step 13	**vrf forwarding** *vrf-name* **Example:** `Device(config-if)# vrf forwarding Mgmt-vrf`	Associates the VRF with the Layer 3 interface. This command activates multiprotocol VRF on an interface
Step 14	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 192.168.0.1 255.255.0.0`	Defines the IP address for the VRF.
Step 15	**negotiation auto** **Example:** `Device(config-if)# negotiation auto`	Enables auto-negotiation operation for the speed and duplex parameters of an interface.
Step 16	**no shutdown** **Example:** `Device(config-if)# no shutdown`	Restarts a disabled interface.
Step 17	**end** **Example:** `Device(config-if)# end`	Exits the interface configuration mode and enters global configuration mode.
Step 18	**ip http server** **Example:** `Device(config)# ip http server`	(Required) Enables the HTTP server on your IP or IPv6 system, including a Cisco web browser user interface. The HTTP server uses the standard port 80, by default.

	Command or Action	Purpose

Step 19	**ip http authentication local**
	Example:
	`ip http authentication local`
	`Device(config)#`
		(Required) Specifies a particular authentication method for HTTP server users.
		The **local** keyword means that the login user name, password and privilege level access combination specified in the local system configuration (by the username global configuration command) should be used for authentication and authorization.

Step 20	**ip http secure-server** **Example:** `Device(config)# ip http server`	(Required) Enables a secure HTTP (HTTPS) server. The HTTPS server uses the Secure Sockets Layer (SSL) version 3.0 protocol.
Step 21	**ip http max-connections** **Example:** `Device(config)# ip http max-connections 16`	(Required) Configures the maximum number of concurrent connections allowed for the HTTP server. Enter an integer in the range from 1 to 16. The default is 5.
Step 22	**ip tftp source-interface** *interface-type-number* **Example:** `Device(config)# ip tftp source-interface GigabitEthernet0/0`	Specifies the IP address of an interface as the source address for TFTP connections.
Step 23	**ip route** *ip-address ip-mask subnet mask* **Example:** `Device(config)# ip route vrf mgmt-vrf 192.168.0.1 255.255.0.0 192.168.255.1`	Configures a route and gateway on the product instance. You can configure either a static route or a dynamic route.
Step 24	**logging host** **Example:** `Device(config)# logging host 172.25.33.20 vrf Mgmt-vrf`	Logs system messages and debug output to a remote host.

Step 25	**crypto pki trustpoint SLA-TrustPoint**
	Example:
	`Device(config)# crypto pki trustpoint SLA-TrustPoint`
	`Device(ca-trustpoint)#`
		(Required) Declares that the product instance should use trustpoint "SLA-TrustPoint" and enters the ca-trustpoint configuration mode. The product instance does not recognize any trustpoints until you declare a trustpoint using this command.

Step 26	enrollment terminal **Example:** `Device(ca-trustpoint)# enrollment terminal`	(Required) Specifies the certificate enrollment method.
Step 27	**revocation-check none** **Example:** `Device(ca-trustpoint)# revocation-check none`	(Required) Specifes a method that is to be used to ensure that the certificate of a peer is not revoked. For the SSM On-Prem Deployment topology, enter the **none** keyword. This means that a revocation check will not be performed and the certificate will always be accepted.

	Command or Action	Purpose

Step 28	**end**
	Example:
	`Device(ca-trustpoint)# exit`
	`Device(config)# end`
		Exits the ca-trustpoint configuration mode and then the global configuration mode and returns to privileged EXEC mode.

Step 29	**show ip http server session-module** **Example:** `Device# show ip http server session-module`	(Required) Verifies HTTP connectivity. In the output, check that `SL_HTTP` is active. Additionally, you can also perform the following checks : • From device where SSM On-Prem is installed, verify that you can ping the product instance. A successful ping confirms that the product instance is reachable. • From a Web browser on the device where SSM On-Prem is installed verify `https://<product-instance-ip>/`. This ensures that the REST API from SSM On-Prem to the product instance works as expected.
Step 30	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	Saves your entries in the configuration file.

Submitting an Authorization Code Request (SSM On-Prem UI)

With the SSM On-Prem Deployment topology, the authorization codes required for export-controlled and enfored licenses must be generated in Cisco SSM and imported into SSM On-Prem before the product instance can request the same. This procedure shows you the steps you have to complete in SSM On-Prem (to submit the request and then import SLAC), points you to the procedure you have to complete in Cisco SSM (to generate and download SLAC), and to the procedure you have to complete on the product instance (to finally request and install SLAC).

Before you begin

Supported topologies:

- SSM On-Prem Deployment (SSM On-Prem-initiated communication)
- SSM On-Prem Deployment (product instance-initiated communication).

Ensure that you have an adequate positive balace of the necessary export-controlled or enforced licenses in your Smart Account and Virtual Account in Cisco SSM.

Step 1 Log into SSM On-Prem and select **Smart Licensing**.

Step 2 Navigate to **Inventory** > **SL Using Policy**. Select all the product instances for which you want to request SLAC.

Step 3 Click **Actions for Selected…** > **Authorization Code Request**.

The **Authorization Request Information** pop-up window is displayed.

Step 4 Click **Accept** and save the .csv file when prompted.

The generated .csv file contains the list of selected product instances along with required device information, in the required format, to generate the SLAC in Cisco SSM. Save this file in a location that is accessible when you are working on the Cisco SSM Web UI (in the next step).

Step 5 Complete this task in Cisco SSM: Generating and Downloading SLAC from Cisco SSM to a File, on page 113.

You can use the above procedure to generate SLAC for a single product instance and for multiple product instances. For the SSM On-Prem Deployment topology, follow the steps to generate SLAC for multiple product instances.

Step 6 Again navigate to **Inventory** > **SL Using Policy**.

Step 7 Click **Export/Import All…** > **Import From Cisco**.

Import the .csv file download at the end of the procedure in Step 4 above.

To verify import, under **Inventory** > **SL Using Policy**, see the Alerts column. The following message is displayed: Authorization message received from Cisco SSM.

Step 8 Complete the final step depending on whether the product instance or SSM On-Prem initiates communication.

- For product instance-initiated communication, configure the product instance to request and install SLAC from SSM On-Prem. See: Manually Requesting and Auto-Installing a SLAC , on page 107
- For SSM On-Prem-initiated communication, the uploaded codes are applied to the product instances the next time SSM On-Prem runs an update.

Manually Requesting and Auto-Installing a SLAC

To request Cisco SSM or CSLU or SSM On-Prem for a SLAC and have it automatically installed on the product instance, perform the following steps on the product instance:

Before you begin

Supported topologies:

- Connected to Cisco SSM Through CSLU (product instance-initiated and CSLU-initiated communication)
- Connected Directly to Cisco SSM
- CSLU Disconnected from Cisco SSM (product instance-initiated and CSLU-initiated communication)
- SSM On-Prem Deployment (product instance-initiated communication)

Before you proceed, check the following as well:

- You have the required number of HSECK9 keys in the applicable Smart Account and Virtual Account in Cisco SSM.

  Each UDI where you want to use a cryptographic feature requires one HSECK9 key. Each HSECK9 key requires a SLAC. When you follow this task to request and install SLAC on the product instance, the usage count of the HSECK9 key is updated accordingly in Cisco SSM.

Note The following restriction applies only to Cisco Catalyst 9400 Series Supervisor Modules supporting the HSECK9 key: In a Cisco StackWise Virtual set-up, when requesting SLAC for a product instance that is connected to CSLU or SSM On-Prem, even if you use the option to request SLAC only for the active (the **local** keyword), SLAC is requested and installed for the active *and* standby. You must therefore ensure that you have two available HSECK9 keys - one for each chassis UDI - in the Smart Account and Virtual Account in Cisco SSM. A corresponding SLAC is then installed for each chassis UDI.

This restriction does not affect a single or a dual-supervisor setup, because only one HSECK9 and one corresponding SLAC is required in these setups.

- The product instance on which you are requesting the SLAC is connected Cisco SSM, or CSLU, or SSM On-Prem.
- The transport type and URL are configured accordingly. In the **show license all** command in privileged EXEC mode. In the output, check field `Transport: .`
- You have installed a trust code by generating a token, if you are directly connected to Cisco SSM. Enter the **show license all** command in privileged EXEC mode. In the output check field `Trust Code Installed:`
- In case of an SSM On-Prem Deployment, the product instance requests SSM On-Prem for SLAC, so ensure that you have made the required number of SLACs available in the SSM On-Prem server before you can begin with this task.

SUMMARY STEPS

1. **enable**
2. **license smart authorization request** {**add** | **replace**} *feature_name* {**all** | **local**}
3. (Optional) **license smart sync** {**all** | **local**}
4. Complete remaining steps for applicable topologies.
5. **show license authorization**
6. Configure the cryptographic feature.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**license smart authorization request** {**add** | **replace**} *feature_name* {**all** | **local**} **Example:** `Device# license smart authorization request add hseck9 all`	Requests a SLAC from Cisco SSM or CSLU or SSM On-Prem. • Specify if you want to add to or replace an existing SLAC:

	Command or Action	Purpose
		• **add**: This adds the requested key to an existing SLAC. The new SLAC will contain all the keys of the existing SLAC, and the requested key. • **replace**: This replaces the existing SLAC. The new SLAC will contain only the requested key. All HSECK9 keys in the existing SLAC are returned. When you enter this keyword, the product instance checks if these existing keys are in-use. If they are, an error message is displayed, telling you to first disable the corresponding cryptographic feature. **Note** On Cisco Catalyst 9300X Series Switches in a stacking setup: If you have added a device (where SLAC is not installed) to an existing stack where SLAC is already installed, use the **replace** and **all** keywords. This returns all HSECK9 keys in the existing SLAC and requests SLAC for all the devices in the stack. You cannot request SLAC for a particular member. Your only options are: either the active, or the entire stack. **Note** This keyword is not supported on Cisco Catalyst 9400 Series Supervisor Modules in a Cisco StackWise Virtual set-up. If SLAC is installed only on the active and you want to install it on the standby as well, return the SLAC which is on the active and then request and install SLAC on the active and standby again. • *feature_name*: Enter the name of the export-controlled license for which you want to request an addition or a replacement of the SLAC. Enter "hseck9" to request and install SLAC for the HSECK9 key. • Specify the device by entering one of these options: • **all**: Gets the authorization code for *all* devices in a High Availability and stacking set-up. In case of a stacking setup or a Cisco StackWise Virtual setup, we recommend that you use this option and install SLAC for the active and the standby. This ensures uninterrupted use of the cryptographic feature in the event of a switchover.

	Command or Action	Purpose
		• **local**: Gets the authorization code for the *active* device in a High Availability and stacking set-up. This is the default option.
Step 3	(Optional) **license smart sync** {**all** | **local**} **Example:** `Device# license smart sync all`	Triggers the product instance to synchronize with Cisco SSM, or CSLU, or SSM On-Prem, to send and receive any pending data. This step applies only to topologies where the product instance is connected to Cisco SSM, or CSLU or SSM On-Prem, and where the product instance initiates communication. The topologies are: *Connected Directly to Cisco SSM*, *Connected to Cisco SSM Through CSLU* (product instance-initiated), and SSM On-Prem Deployment (product instance-initiated). By triggering an on-demand synchronization, you can ensure that the SLAC installation process is completed soon after you request SLAC. Otherwise, SLAC is applied to the product instance only the next time the product instance is *scheduled* to contact Cisco SSM, or CSLU or SSM On-Prem.
Step 4	Complete remaining steps for applicable topologies.	• For *Connected to Cisco SSM Through CSLU* (CSLU-initiated communication), see Tasks for CSLU-Initiated Communication, on page 29. • For *CSLU Disconnected from Cisco SSM* (product instance-initiated and CSLU-initiated communication), see Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33. • For *SSM On-Prem Deployment* (product instance-initiated communication), see Workflow for Topology: SSM On-Prem Deployment, on page 39

Step 5	**show license authorization**
	Example:
	`Device# show license authorization`
	`Overall status:`
	`  Active: PID:C9300X-24HX,SN:FOC2519L8R7`
	`  Status: SMART AUTHORIZATION INSTALLED on Oct 29 17:45:28 2021 UTC`
	`  Last Confirmation code: 6746c5b5`
	`  Standby: PID:C9300X-48HXN,SN:FOC2524L39P`
	`  Status: NOT INSTALLED`
	`  Member: PID:C9300X-48HX,SN:FOC2516LC92`
	`  Status: NOT INSTALLED`
	
	`Authorizations:`
	`  C9K HSEC (Cat9K HSEC):`
	`  Description: HSEC Key for Export Compliance on`
		Displays the SLAC that is installed on the product instance.

	Command or Action	Purpose
	Cat9K Series Switches Total available count: 1 Enforcement type: EXPORT RESTRICTED Term information: Active: PID:C9300X-24HX,SN:FOC2519L8R7 Authorization type: SMART AUTHORIZATION INSTALLED License type: PERPETUAL Term Count: 1 Purchased Licenses: No Purchase Information Available	
Step 6	Configure the cryptographic feature. **Example:** Device# **show license summary** License Usage: License Count Status — Entitlement Tag network-advantage (C9300-24 Network Advan...) 1 IN USE dna-advantage (C9300-24 DNA Advantage) 1 IN USE network-advantage (C9300-48 Network Advan...) 2 IN USE dna-advantage (C9300-48 DNA Advantage) 2 IN USE hseck9 (Cat9K HSEC) 1 IN USE	After you configure the cryptographic feature, the usage count and status of HSECK9 key in the output of the **show license summary** privileged EXEC command changes to `1` and `IN USE`, respectively Depending on the cryptopgraphic feature and the product instance, refer to the correspoding document: For information about disabling the IPsec feature on Cisco Catalyst 9300X Series Switches, see the *Configuring IPsec* chapter of the *Security Configuration Guide, Cisco IOS XE <applicable release number> (Catalyst 9300 Switches)*. For information about disabling the IPsec feature on Cisco Catalyst 9400 Series Supervisor 2 and 2XL Modules, see the *Configuring IPsec* chapter of the *Security Configuration Guide, Cisco IOS XE <applicable release number> (Catalyst 9400 Switches)*. For information about disabling the WANMACsec feature on Cisco Catalyst 9500X Series Switches, see the *MACsec Encryption* chapter of the *Security Configuration Guide, Cisco IOS XE <applicable release number> (Catalyst 9500 Switches)* For information about disabling the WANMACsec feature on Cisco Catalyst 9600 Series 40-Port 50G, 2-Port 200G, 2-Port 400G Line Card, see the *MACsec Encryption* chapter of the *Security Configuration Guide, Cisco IOS XE <applicable release number> (Catalyst 9600 Switches)*

Generating and Saving a SLAC Request on the Product Instance

To generate and then save a SLAC request for an HSECK9 key to a file on the product instance, complete the following task:

Note This method of requesting a SLAC is supported starting with Cisco IOS XE Cupertino 17.7.1 only.

Before you begin

Supported topologies: No Connectivity to Cisco SSM and No CSLU

Also ensure that you have the required number of HSECK9 keys in the applicable Smart Account and Virtual Account in Cisco SSM. Each UDI where you want to use a cryptographic feature requires one HSECK9 key. Each HSECK9 key requires a SLAC. After you complete this task you have to upload the SLAC request file in Cisco SSM. Once this is processed in Cisco SSM, the usage count of the HSECK9 key is updated accordingly in Cisco SSM.

SUMMARY STEPS

1. **enable**
2. **license smart authorization request** {**add** | **replace**} *feature_name* {**all**| **local**}
3. **license smart authorization request save***path*
4. Upload the file to Cisco SSM, and then download the file containing the SLAC code.
5. Install the file on the product instance.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**license smart authorization request** {**add** | **replace**} *feature_name* {**all**| **local**} **Example:** `Device# license smart authorization request add hseck9 all`	Generates a SLAC request with all the required information. Specify if you want to add to or replace an existing SLAC: • **add**: Adds the requested key to an existing SLAC. The new authorization code will contain all the keys of the existing SLAC, and the requested license. • **replace**: Replaces the existing SLAC. The new SLAC will contain only the requested HSECK9 key. All keys in the existing SLAC are returned. When you enter this keyword, the product instance checks if these existing keys are in-use. If they are, an error message is displayed, telling you to first disable the corresponding feature. **Note** For a stacking scenario (Cisco Catalyst 9300X Series Switches): If you have added a device (where SLAC is not installed) to an existing stack where SLAC is already installed, use the **replace** and **all** keywords. This returns all HSECK9 keys in the existing SLAC and requests SLAC for all the devices in the stack. You cannot request SLAC for a particular member. Your only options are: either the active, or the entire stack.

	Command or Action	Purpose
		Note This keyword is not supported on Cisco Catalyst 9400 Series Supervisor Modules in a Cisco StackWise Virtual set-up. If SLAC is installed only on the active and you want to install it on the standby as well, return the SLAC which is on the active and then request and install SLAC on the active and standby again. For *feature_name*, enter the name of the export-controlled license for which you want to request an addition or a replacement of the SLAC. Enter "hseck9" to request and install SLAC for the HSECK9 key. Specify the device by entering one of these options: • **all**: Gets the SLAC for *all* devices in a High Availability set-up In case of a stacking setup or a Cisco StackWise Virtual setup, we recommend that you use this option and install SLAC for the active and the standby. This ensures uninterrupted use of the cryptographic feature in the event of a switchover. • **local**: Gets the SLAC for the *active* device in a High Availability set-up. This is the default option.
Step 3	**license smart authorization request save***path* **Example:** `Device# license smart authorization request save bootflash:slac.txt`	Saves the required UDI information for the SLAC request in a .txt file, in the specified location.
Step 4	Upload the file to Cisco SSM, and then download the file containing the SLAC code.	Complete this task: Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124.
Step 5	Install the file on the product instance.	Complete this task: Installing a File on the Product Instance, on page 125.

Generating and Downloading SLAC from Cisco SSM to a File

You can use this procedure to generate SLAC for a single product instance and for multiple product instances.

If it is for a single product instance, you will require the PID and serial number to complete this task. On the product instance, enter the **show license udi** command in privileged EXEC mode and keep this information handy.

If it is for multiple product instances, have the .csv file containing the PIDs and serial numbers of all applicable product instances saved in an accessible location.

Before you begin

Supported topologies:

- Connected to Cisco SSM Through CSLU (Product instance-initiated and CSLU-initiated)
- CSLU Disconnected from Cisco SSM (Product instance-initiated and CSLU-initiated)
- No Connectivity to Cisco SSM and No CSLU
- SSM On-Prem Deployment (product instance-initiated and SSM On-Prem-initiated communication)

Step 1 Log in to the Cisco SSM Web UI at https://software.cisco.com. Under **Smart Software Licensing**, click the **Manage licenses** link.

Log in using the username and password provided by Cisco.

Step 2 Click the **Inventory** tab.

Step 3 From the **Virtual Account** drop-down list, choose the applicable virtual account.

Step 4 Click the **Product Instances** tab.

Step 5 Click the **Authorize License Enforced Features** tab.

Step 6 Generate SLAC for a single product instance or for multiple product instances (*choose one*).

- **To generate SLAC for a single product instance:**
  1. Enter the **PID** and **Serial Number**.

     Note Do not populate any of the other fields.

  2. Choose the license, and in the corresponding **Reserve** column, and enter `1`.

     Ensure that you choose the correct license for a PID. For Cisco Catalyst Access, Core, and Aggregation Switches where the HSECK9 is supported, select "C9K HSEC".

  3. Click **Next**
  4. Click **Generate Authorization Code**.
  5. Download the authorization code and save as a .csv file.
  6. Install the file on the product instance. See Installing a File on the Product Instance, on page 125.

- **To generate SLAC for multiple product instances (you should have a .csv file to upload in this case)**:
  1. From the dropdown list that says “Single Device” (by default), change the selection to “Multiple Devices”.

     At this point, a "Download a template" link is displayed. If you don't already have the required template or file, you can download it. Only the serial number PID are mandatory.

  2. Click **Choose File** and navigate to the .csv file, which contains the list of product instances that require SLAC.
  3. Once uploaded, the list of devices is displayed in Cisco SSM. All the devices will have the checkbox enabled (implying that you want to request a SLAC for all of them), and click **Next**.
  4. Specify the license quantity required for each product instance, and click **Next**.

     Note For the "C9K HSEC" license, one SLAC is required for each UDI.

e. Click **Reserve Licenses**.

f. Download accordingly to topology:

- For the *Connected to Cisco SSM Through CSLU*, *CSLU Disconnected from Cisco SSM*, *SSM On-Prem Deployment* topologies, click **Download Authorization Codes** to download a.csv file containing all the authorization codes. Click **Close**.

  You can now import this .csv file to CSLU or SSM On-Prem. Return to the CSLU or SSM On-Prem interface to complete the remaining steps to import this file.

- For the *No Connectivity to Cisco SSM and No CSLU* topology (in an air-gapped network), where you have to import the code into the product instance, download the authorization code for each product instance to a separate .txt file. Do not download the .csv file which has all the codes.

  In the Cisco SSM Web UI, return to the **Inventory**> **Product Instances** tab. Locate each product instance by its PID or serial number. Click on the UDI to display the **Overview** tab. The **Last Contact** field displays a link called *Download Reservation Authorization Code*. Click on the link to download the authorization code of only the selected product instance, in .txt format.

  Import each SLAC into the product instance, see Installing a File on the Product Instance, on page 125.

Returning an Authorization Code

This task shows you how to return an authorization code for a license and to then return the license to your license pool in Cisco SSM. You can use this procedure for all authorization codes - SLAC and SLR.

Before you begin

Supported topologies: all

SUMMARY STEPS

1. Disable or unconfigure the cryptographic feature for which you used the HSECK9 key.
2. **enable**
3. **show license summary**
4. Depending on the cryptographic feature you were using, enter the applicable command to release the HSECK9 key.
   - For IPSec: **platform hsec-license-release**
   - For WAN MACsec: **platform wanmacsec hsec-license-release**
5. **show license summary**
6. **license smart authorization return** {**all** |**local**} {**offline**[*path*] |**online**}
7. **no license smart reservation**
8. **show license authorization**

DETAILED STEPS

	Command or Action	Purpose
Step 1	Disable or unconfigure the cryptographic feature for which you used the HSECK9 key.	Depending on the cryptopgraphic feature and the product instance, refer to the correspoding document: For information about disabling the IPsec feature on Cisco Catalyst 9300X Series Switches, see the *Configuring IPsec* chapter of the *Security Configuration Guide, Cisco IOS XE <applicable release number> (Catalyst 9300 Switches)*. For information about disabling the IPsec feature on Cisco Catalyst 9400 Series Supervisor 2 and 2XL Modules, see the *Configuring IPsec* chapter of the *Security Configuration Guide, Cisco IOS XE <applicable release number> (Catalyst 9400 Switches)*. For information about disabling the WANMACsec feature on Cisco Catalyst 9500X Series Switches, see the *MACsec Encryption* chapter of the *Security Configuration Guide, Cisco IOS XE <applicable release number> (Catalyst 9500 Switches)* For information about disabling the WANMACsec feature on Cisco Catalyst 9600 Series 40-Port 50G, 2-Port 200G, 2-Port 400G Line Card, see the *MACsec Encryption* chapter of the *Security Configuration Guide, Cisco IOS XE <applicable release number> (Catalyst 9600 Switches)* If the cryptographic feature you are disabling is the WAN MACsec feature, also note the following: Even after disabling the cryptographic feature, the output of the **show license summary** command displays the usage count and status for the HSECK9 key as `1` and `IN USE`. This is as expected. The steps in this task show you how to *release* the key, which changes the count and status to `0` and `NOT IN USE`. But you must disable the WAN MACsec feature before you try to release the HSECK9 key.
Step 2	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.

Step 3	**show license summary**
	Example:
	`Device# show license summary`
	`License Usage:`
	`License Entitlement Tag Count Status`
	`----------`
	`network-advantage (C9300-24 Network Advan...) 1 IN USE`
		(Optional) Displays license usage summary. This step applies only if you are returning a SLAC.
		If the status of the HSECK9 key is displayed as `NOT IN USE` skip to Step 5.
		If the status of the HSECK9 key is displayed as `IN USE` even after the cryptographic feature is disabled, then perform the next step. This is the case in the accompanying example.

	Command or Action	Purpose
	dna-advantage (C9300-24 DNA Advantage) 1 IN USE network-advantage (C9300-48 Network Advan...) 2 IN USE dna-advantage (C9300-48 DNA Advantage) 2 IN USE **C9K HSEC (Cat9K HSEC)** **1 IN USE**	

Step 4	Depending on the cryptographic feature you were using, enter the applicable command to release the HSECK9 key.
	• For IPSec: **platform hsec-license-release**
	• For WAN MACsec: **platform wanmacsec hsec-license-release**
	Example:
	`Device# configure terminal`
	`Device(config)# platform hsec-license-release`
	`HSEC license is released`
	`Device(config)# exit`
		(Optional) Enters the global configuration mode, releases the HSECK9 key, and returns to privileged EXEC mode. This step applies only if you are returning a SLAC.
		If the cryptographic feature using the HSECK9 key has been disabled or unconfigured, and the license is still displayed as `IN USE`, this command forces the HSECK9 key to be marked as `NOT IN USE`. If the status of the HSECK9 key is still displayed as `IN USE`, repeat Step 1.

Step 5	**show license summary**
	Example:
	`Device# show license summary`
	`License Usage:`
	`License Entitlement Tag`
	`Count Status`
	`-----------------------------------------------------`
	`network-advantage (C9300-24 Network Advan...)`
	`1 IN USE`
	`dna-advantage (C9300-24 DNA Advantage)`
	`1 IN USE`
	`network-advantage (C9300-48 Network Advan...)`
	`2 IN USE`
	`dna-advantage (C9300-48 DNA Advantage)`
	`2 IN USE`
	`C9K HSEC (Cat9K HSEC)`
	`0 NOT IN USE`
		(Optional) Displays license usage summary. This step applies only if you are returning a SLAC.
		Ensure that the status of the license that you want to return is `NOT IN USE`.

Step 6	**license smart authorization return** {**all** |**local**} {**offline**[*path*] |**online**}
	Example:
	`Device# license smart authorization return all online`
	`OR`
	`Device# license smart authorization return all offline`
	`Enter this return code in Cisco Smart Software Manager portal:`
	`UDI: PID:C9300X-24HX,SN:FOC2519L8R7`
	`Return code:`
	`Cr9JHx-L1x5Rj-ftwzg1-h9QZAU-LE5DT1-babWeL-FABPt9-Wr1Dn7-Rp7`
		Returns an authorization code back to the license pool in Cisco SSM. A return code is displayed after you enter this command.
		Specify the product instance:
		• **all**: Performs the action for all connected product instances in a High Availability or stacking set-up.
		• **local**: Performs the action for the active product instance. This is the default option.
		Specify if you are connected to Cisco SSM or not:
		• If the product instance is directly connected to Cisco SSM, or it is connected to Cisco SSM through CSLU

	Command or Action	Purpose
	OR `Device# license smart authorization return all offline bootflash:return-code.txt`	or SSM On-Prem and the product instance-initiates communication, enter **online**. The code is automatically returned to Cisco SSM and a confirmation is returned and installed on the product instance. If you choose this option, the return code is automatically submitted to Cisco SSM. • If the product instance is not connected to Cisco SSM, or if you have implemented a topology with CSLU-initiated or SSM On-Prem initiated communication, enter **offline** [*filepath_filename*]. If you choose the offline option, you must complete the additional step of submitting this to Cisco SSM. • For software versions Cisco IOS XE Cupertino 17.7.1 and later only: Specify a path to save the SLAC return request in a file and upload the file to Cisco SSM: Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124. The file format can be any readable format. For example: `Device# license smart authorization return local offline bootflash:return-code.txt`. • For software versions prior to 17.7.1: If you are returning a SLAC, copy the return code that is displayed on the CLI and complete this task to enter the return code in Cisco SSM: Entering a SLAC Return Code in Cisco SSM and Removing a Product Instance, on page 119. • For all software versions, if you are returning an SLR authorization code, copy the return code that is displayed on the CLI and complete this task to enter the return code in Cisco SSM: #unique_86. Proceed with the next step only after you complete this step.

Step 7	**no license smart reservation**
	Example:
	`Device# configure terminal`
	`Device(config)# no license smart reservation`
	`Device(config)# exit`
		Enter the global configuration mode, disables SLR configuration on the product instance, and returns to privileged EXEC mode.
		This step is required only if the authorization code you are returning is an SLR authorization code. Skip this step if the code you are returning is a SLAC for an HSECK9 key.

	Command or Action	Purpose
		Note You must complete the authorization code return process (**license smart authorization return**), online or offline, before you enter the **no license smart reservation** command in this step. Otherwise, the return may not be reflected in Cisco SSM or in the **show** command, and you will have to contact your Cisco technical support representative to rectify the problem.

Step 8	**show license authorization**
	Example:
	`Device# show license authorization`
	`Overall status:`
	`  Active: PID:C9300X-24HX,SN:FOC2519L8R7`
	`  Status: NOT INSTALLED`
	`  Last return code:`
	`Cr9JHx-L1x5Rj-ftwzg1-h9QZAU-LE5DT1-`
	`babWeL-FABPt9-Wr1Dn7-Rp7`
	`  Standby: PID:C9300X-48HXN,SN:FOC2524L39P`
	`  Status: NOT INSTALLED`
	`  Member: PID:C9300X-48HX,SN:FOC2516LC92`
	`  Status: NOT INSTALLED`
	
	`<output truncated>`
		Displays licensing information. If the return process is completed correctly, the `Last return code:` field displays the return code.

Entering a SLAC Return Code in Cisco SSM and Removing a Product Instance

You can use this task to complete the return procedure for a SLAC when the product instance is not connected to Cisco SSM. This returns the HSECK9 keys to the license pool. Additionally, you also have the option of removing the product instance from Cisco SSM.

Before you begin

Supported topologies: all

Follow this procedure only if you are returning a SLAC.

Ensure that you have generated a return code as shown in Returning an Authorization Code, on page 115. (Enter it in Step 7 in this task).

Step 1 Log in to the Cisco SSM Web UI at https://software.cisco.com. Under **Smart Software Licensing**, click the **Manage licenses**link.

Log in using the username and password provided by Cisco.

Step 2 Click the **Inventory** tab.

Step 3 From the **Virtual Account** drop-down list, choose your Virtual Account.

Step 4 Click the **Product Instances** tab.

The list of product instances that are available is displayed.

Step 5 Locate the required product instance from the product instances list. You can enter the PID or serial number in the search tab to locate it.

Step 6 In the Actions column of the product instance, from the **Actions** dropdown list, select **Remove**.

The **Remove Reservation** window is displayed.

Step 7 In the **Reservation Return Code** field, enter the SLAC return code you generated.

Step 8 Click **Remove Reservation**.

The HSECK9 key is returned to the license pool. The Remove Reservation window is automatically closed and you return to the **Product Instances** tab.

Note If you want to only return the SLAC, your task ends here. If you also want to remove the product instance from Cisco SSM, continue to the next step.

Step 9 In the Actions column of the product instance, from the **Actions** dropdown list, *again* select **Remove**.

The **Confirm Remove Product Instance** window is displayed.

Step 10 Click **Remove Product Instance**.

The product instance is removed from Cisco SSM and no longer consumes any licenses.

Entering an SLR Return Code in Cisco SSM and Removing the Product Instance

You can use this task to complete the return prcedure for an SLR authorization code. This returns the licenses to the license pool and removes the product instance.

Before you begin

Supported topologies: all

Follow this procedure only if you are returning an SLR authorization code.

Ensure that you have generated a return code as shown in Returning an Authorization Code, on page 115. (Enter it in Step 7 in this task).

Step 1 Log in to the Cisco SSM Web UI at https://software.cisco.com. Under **Smart Software Licensing**, click the **Manage licenses**link.

Log in using the username and password provided by Cisco.

Step 2 Click the **Inventory** tab.

Step 3 From the **Virtual Account** drop-down list, choose your Virtual Account.

Step 4 Click the **Product Instances** tab.

The list of product instances that are available is displayed.

Step 5 Locate the required product instance from the product instances list. You can enter the PID or serial number in the search tab to locate it.

Step 6 In the Actions column of the product instance, from the **Actions** dropdown list, select **Remove**.

- If the product instance is *not* using a license with an SLR authorization code then the **Confirm Remove Product Instance** window is displayed.
- If the product instance *is* using a license with an SLR authorization code, then the **Remove Product Instance** window, with a field for return code entry is displayed.

Step 7 In the **Reservation Return Code** field, enter the return code you generated.

Note This step applies only if the product instance is using a license with an SLR authorization code.

Step 8 Click **Remove Product Instance**.

The license is returned to the license pool and the product instance is removed.

Generating a New Token for a Trust Code from CSSM

To generate a token to request a trust code, complete the following steps.

Generate one token for each *Virtual Account* you have. You can use same token for all the product instances that are part of one Virtual Account.

Before you begin

Supported topologies: Connected Directly to CSSM

Step 1 Log in to the CSSM Web UI at https://software.cisco.com. Under **Smart Software Licensing**, click the **Manage licenses**link.

Log in using the username and password provided by Cisco.

Step 2 Click the **Inventory** tab.

Step 3 From the **Virtual Account** drop-down list, choose the required virtual account

Step 4 Click the **General** tab.

Step 5 Click **New Token**. The **Create Registration Token** window is displayed.

Step 6 In the **Description** field, enter the token description

Step 7 In the **Expire After** field, enter the number of days the token must be active.

Step 8 (Optional) **In the Max. Number of Uses** field, enter the maximum number of uses allowed after which the token expires.

Note If you enter a value here, ensure that you stagger the installation of the trust code during the next part of the process. If you want to simultaneously install the trust code on a large number of product instances, we recommend that you leave this field blank. Entering a limit here and simultaneously installing it on a large number of devices causes a bottleneck in the processing of these requests in CSSM and installation on some devices may fail, with the following error: `Failure Reason: Server error occurred: LS_LICENGINE_FAIL_TO_CONNECT`.

Step 9 Click **Create Token**.

Step 10 You will see your new token in the list. Click **Actions** and download the token as a `.txt` file.

Establishing Trust with an ID Token

This task shows you how to establish trust. Here, you use the ID token downloaded from Cisco SSM and submit a trust request. Cisco SSM responds with the trust code, which is automatically installed on the product instance.

Before you begin

Supported topologies: Connected Directly to Cisco SSM

You must have already generated and downloaded an ID token file from Cisco SSM: Generating a New Token for a Trust Code from CSSM, on page 121.

SUMMARY STEPS

1. **enable**
2. **license smart trust idtoken** *id_token_value* {**local** | **all**} [**force**]
3. **show license status**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted
Step 2	**license smart trust idtoken** *id_token_value* {**local** | **all**} [**force**] **Example:** `Device# license smart trust idtoken NGMwMjk5mYtNZaxMS00NzMZmtgWm all force`	Establishes a trusted connection with Cisco SSM. For *id_token_value*, enter the token you generated in Cisco SSM. Enter one of following options: • **local**: Submits the trust request only for the active device in a High Availability set-up. This is the default option. • **all**: Submits the trust request for all devices in a High Availability set-up.

	Command or Action	Purpose
		Enter the **force** keyword to submit the trust code request in spite of an existing trust code on the product instance. Trust codes are node-locked to the UDI of the product instance. If a UDI is already registered, Cisco SSM does not allow a new registration for the same UDI. Entering the **force** keyword sets a force flag in the message sent to Cisco SSM to create a new trust code even if one already exists. You may for example need to use the **force** keyword if there is already a factory-installed trust code on the product instance. A trust code is factory-installed starting with Cisco IOS XE Cupertino 17.7.1. Since a factory-installed trust code cannot be used for secure communication with Cisco SSM, you must use the **force** keyword to overwrite it with the trust code obtained using the ID token. Also see: Trust Code, on page 6.

Step 3	**show license status**
	
	Example:
	`<output truncated>`
	`Trust Code Installed:`
	`  Active: PID:C9500-24Y4C,SN:CAT2344L4GH`
	`  INSTALLED on Sep 04 01:01:46 2020 EDT`
	`  Standby: PID:C9500-24Y4C,SN:CAT2344L4GJ`
	`  INSTALLED on Sep 04 01:01:46 2020 EDT`
		Displays date and time if trust code is installed. Date and time are in the local time zone. See field `Trust Code Installed:`.

Downloading a Policy File from Cisco SSM

If you have requested a custom policy or if you want to apply a policy that is different from the default that is applied to the product instance, complete the following task:

Before you begin

Supported topologies:

- No Connectivity to Cisco SSM and No CSLU
- CSLU Disconnected from Cisco SSM

Step 1 Log in to the Cisco SSM Web UI at https://software.cisco.com. Under **Smart Software Licensing**, click the **Manage licenses**link.

Log in using the username and password provided by Cisco.

Step 2 Follow this directory path: **Reports** > **Reporting Policy**.

Step 3 Click **Download**, to save the `.xml` policy file.

You can now install the file on the product instance. See Installing a File on the Product Instance, on page 125.

Uploading Data or Requests to Cisco SSM and Downloading a File

You can use this task to:

- To upload a RUM report to Cisco SSM and download an ACK.
- To upload a SLAC request file and download a SLAC code file.

  This applies only to the *No Connectivity to Cisco SSM and No CSLU* topology and is supported starting with Cisco IOS XE Cupertino 17.7.1.
- To upload a SLAC or SLR authorization code return request.

  This applies only to the *No Connectivity to Cisco SSM and No CSLU* topology and is supported starting with Cisco IOS XE Cupertino 17.7.1.

To upload a file to Cisco SSM and download file when the product instance is not connected to Cisco SSM or CSLU, or when SSM On-Prem is not connect to Cisco SSM, complete the following task:

Before you begin

Supported topologies:

- No Connectivity to Cisco SSM and No CSLU
- CSLU Disconnected from Cisco SSM
- SSM On-Prem Deployment (Product instance-initiated and SSM On-Prem-initiated communication)

Step 1 Log in to the Cisco SSM Web UI at https://software.cisco.com. Under **Smart Software Licensing**, click the **Manage licenses** link.

Log in using the username and password provided by Cisco.

Step 2 Select the **Smart Account** that will receive the report.

Step 3 Select **Smart Software Licensing** → **Reports** → **Usage Data Files**.

Step 4 Click **Upload Usage Data**. Browse to the file location (RUM report in tar format), select, and click **Upload Data**.

Upload a RUM report (`.tar` format), or a SLAC request file (`.txt` format), or a SLAC return request file (`.txt` format).

You cannot delete a file after it has been uploaded. You can however upload another file, if required.

Step 5 From the Select Virtual Accounts pop-up, select the Virtual Account that will receive the uploaded file. The file is uploaded to Cisco and is listed in the Usage Data Files table in the Reports screen showing the File Name, time is was Reported, which Virtual Account it was uploaded to, the Reporting Status, Number of Product Instances reported, and the Acknowledgement status.

Step 6 In the Acknowledgement column, click Download to save the ACK or SLAC file for the report or request you uploaded.

You may have to wait for the file to appear in the Acknowledgement column. If there many RUM reports or requests to process, Cisco SSM may take a few minutes.

After you download the file, import and install the file on the product instance, or transfer it to CSLU or SSM On-Prem.

Installing a File on the Product Instance

To import and install a policy, or ACK, or SLAC, on the product instance, complete the following task:

Before you begin

Supported topologies: No Connectivity to Cisco SSM and No CSLU

You have saved the corresponding file in a location that is accessible to the product instance.

- For a policy, see Downloading a Policy File from Cisco SSM, on page 123.
- For an ACK, see Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124.
- For a SLAC, see Generating and Downloading SLAC from Cisco SSM to a File, on page 113 or Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124 (There are multiple ways to obtain a SLAC).

SUMMARY STEPS

1. **enable**
2. **copy** *source filename* **bootflash:**
3. **license smart import** *filepath_filename*
4. **show license all**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**copy** *source filename* **bootflash:** **Example:** `Device# copy tftp://10.8.0.6/user01/example.txt bootflash:`	(Optional) Copies the file from its source location or directory to the flash memory of the product instance. You can also import the file *directly* from a remote location and install it on the product instance (next step). • *source*: This is the source location of file. The source can be either local or remote. • **bootflash:**: This is the destination for boot flash memory.

	Command or Action	Purpose
Step 3	**license smart import** *filepath_filename* **Example:** `Device# license smart import bootflash:example.txt`	Imports and installs the file on the product instance. For *filepath_filename*, specify the location, including the filename. After installation, a system message displays the type of file you installed. **Note** If you generated SLAC for multiple product instances (as in a stacking set-up) in the Cisco SSM Web UI, that is, you followed the method described here: Generating and Downloading SLAC from Cisco SSM to a File, on page 113, ensure that you download a separate .txt SLAC file for each UDI. Import and install one file at a time.
Step 4	**show license all** **Example:** `Device# show license all`	Displays license authorization, policy, and reporting information for the product instance.

Setting the Transport Type, URL, and Reporting Interval

To configure the mode of transport for a product instance, complete the following task:

Before you begin

Supported topologies: all

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **license smart transport** { **automatic** | **callhome** | **cslu** | **off** | **smart** }
4. **license smart url** { *url* | **cslu** *cslu_url* | **default** | **smart** *smart_url* | **utility** *smart_url* }
5. **license smart usage interval** *interval_in_days*
6. **exit**
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	

	Command or Action	Purpose
Step 3	**license smart transport** {**automatic** | **callhome** | **cslu** | **off** | **smart**} **Example:** `Device(config)# license smart transport cslu`	Configures a mode of transport for the product instance to use. Choose from the following options: • **automatic**: Sets the transport mode **cslu**. • **callhome**: Enables Call Home as the transport mode. • **cslu**: This is the default transport mode. Enter this keyword if you are using CSLU *or* SSM On-Prem, with product instance-initiated communication. While the transport mode keyword is the same for CSLU and SSM On-Prem, the transport URLs are different. See **license smart url cslu** *cslu_or_on-prem_url* in the next step. • **off**: Disables all communication from the product instance. • **smart**: Enables Smart transport.

Step 4	**license smart url** {*url* | **cslu** *cslu_url* | **default** | **smart** *smart_url* | **utility** *smart_url*}
	Example:
	`Device(config)# license smart url cslu http://192.168.0.1:8182/cslu/v1/pi`
		Sets a URL for the configured transport mode. Depending on the transort mode you have chosen to configure in the previous step, configure the corresponding URL here:
		• *url*: If you have configured the transport mode as **callhome**, configure this option. Enter the Cisco SSM URL exactly as follows:
		`https://tools.cisco.com/its/service/oddce/services/DDCEService`
		The **no license smart url** *url* command reverts to the default URL.
		• **cslu** *cslu_or_on-prem_url*: If you have configured the transport mode as **cslu**, configure this option with the URL for CSLU or SSM On-Prem, as applicable.
		• If you are using CSLU, enter the URL as follows:
		`http://<cslu_ip_or_host>:8182/cslu/v1/pi`
		For `<cslu_ip_or_host>`, enter the hostname or the IP address of the windows host where you have installed CSLU. 8182 is the port number and it is the only port number that CSLU uses.
		The **no license smart url cslu** *cslu_url* command reverts to `http://cslu-local:8182/cslu/v1/pi`
		• If you are using SSM On-Prem, enter the URL as follows:
		`http://<ip>/cslu/v1/pi/<tenant ID>`
		For <ip>, enter the hostname or the IP address of the server where you have installed SSM

	Command or Action	Purpose
		On-Prem. The <tenantID> must be the default local virtual account ID. **Tip** You can retrieve the entire URL from SSM On-Prem. See Retrieving the Transport URL (SSM On-Prem UI), on page 98 The **no license smart url cslu** *cslu_url* command reverts to `http://cslu-local:8182/cslu/v1/pi` • **default**: Depends on the configured transport mode. Only the **smart** and **cslu** transport modes are supported with this option. If the transport mode is set to **cslu**, and you configure **license smart url default**, the CSLU URL is configured automatically (`https://cslu-local:8182/cslu/v1/pi`). If the transport mode is set to **smart**, and you configure **license smart url default**, the Smart URL is configured automatically (`https://smartreceiver.cisco.com/licservice/license`). • **smart** *smart_url*: If you have configured the transport type as **smart**, configure this option. Enter the URL exactly as follows: `https://smartreceiver.cisco.com/licservice/license` When you configure this option, the system automatically creates a duplicate of the URL in **license smart url** *url*. You can ignore the duplicate entry, no further action is required. The **no license smart url smart***smart_url* command reverts to the default URL. • **utility** *smart_url*: Although available on the CLI, this option is not supported.
Step 5	**license smart usage interval** *interval_in_days* **Example:** `Device(config)# license smart usage interval 40`	(Optional) Sets the reporting interval in days. By default the RUM report is sent every 30 days. The valid value range is 1 to 3650. If you set the value to zero, RUM reports are not sent, regardless of what the applied policy specifies - this applies to topologies where CSLU or Cisco SSM may be on the receiving end. If you set a value that is greater than zero and the transport type is set to **off**, then, between the *interval_in_days* and the policy value for `Ongoing reporting`

	Command or Action	Purpose
		`frequency(days):`, the lower of the two values is applied. For example, if *interval_in_days* is set to 100, and the value in the in the policy says `Ongoing reporting frequency (days):90`, RUM reports are sent every 90 days. If you do not set an interval, and the default is effective, the reporting interval is determined entirely by the policy value. For example, if the default value is effective and only unenforced licenses are in use, if the policy states that reporting is not required, then RUM reports are not sent.
Step 6	**exit** **Example:** `Device(config)# exit`	Exits global configuration mode and returns to privileged EXEC mode.
Step 7	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	Saves your entries in the configuration file.

Configuring a Base or Add-On License

After you order and purchase a base or add-on license, you must configure the license on the device before you can use it.

This task sets a license level and requires a reload before the configured changes are effective. You can use this task to:

- Change the current license.
- Add another license. For example, if you are currently using Network Advantage and you also want to use features available with the corresponding Digital Networking Architecture (DNA) Advantage license.
- Remove a license.

Before you begin

Supported topologies: all

For information about the available base and add-on licenses, see Base and Add-On Licenses.

Information about the licenses that you have purchased can be found in the Smart Account and Virtual Account of the product instance in the Cisco Smart Software Manager (CSSM) Web UI.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **license boot level** { **network-advantage** [**addon dna-advantage**] | **network-essentials** [**addon dna-essentials**] }
4. **exit**

5. **copy running-config startup-config**
6. **show version**
7. **reload**
8. **show version**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**license boot level** { **network-advantage** [**addon dna-advantage**] | **network-essentials** [**addon dna-essentials**] } **Example:** `Device(config)# license boot level network-advantage add-on dna-advantage`	Activates the configured license on the product instance. • **network-advantage** [**addon dna-advantage**]: Configures the Network Advantage license. Optionally, you can also configure the Digital Networking Architecture (DNA) Advantage license. • **network-advantage** [**addon dna-advantage**]: Configures the Network Essentials license. Optionally, you can also configure the Digital Networking Architecture (DNA) Essentials license. In the accompanying example, the DNA Advantage license will be activated on the product instance after reload.
Step 4	**exit** **Example:** `Device(config)# exit`	Returns to the privileged EXEC mode.
Step 5	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	Saves changes in the configuration file.

Step 6	**show version**
	Example:
	`Device# show version`
	
	`<output truncated>`
	`Technology Package License Information:`
	
	`------------------------------------------------------`
	`Technology-package`
	`Technology-package`
		Shows currently configured license information and the license that is applicable after reload.
		The "`Technology-package Next reboot`" column displays the change in the configured license that is effective after reload, only if you save the configuration change.
		In the accompanying example, the current license level is Network Advantage. Because the configuration change was saved, the "`Technology-package Next reboot`" column

	Command or Action	Purpose
	Current Type Next reboot ——————————————————— network-advantage Smart License network-advantage Subscription Smart License dna-advantage <output truncated>	shows that the DNA Advantage license will be activated after reload.
Step 7	**reload** **Example:** Device# **reload**	Reloads the device.
Step 8	**show version** **Example:** Device# **show version** <output truncated> Technology Package License Information: ——————————————————— Technology-package Technology-package Current Type Next reboot ——————————————————— network-advantage Smart License network-advantage dna-advantage Subscription Smart License dna-advantage <output truncated>	Shows currently configured license information and the license that is applicable after reload.

What to do next

After you configure a license level, the change is effective after a reload. To know if reporting is required, refer to the output of the **show license status** privileged EXEC command and check the `Next ACK deadline:` and `Next report push:` fields.

Note The change in license usage is recorded on the product instance. The next steps relating to reporting - if required - depend on your current topology.

- Connected to CSSM Through CSLU
  - Product Instance-initiated communication: No action required. Since the product instance initiates communication, it automatically sends out the RUM report at the scheduled time, as per the policy (**show license status** —> `Next report push`), to CSLU. (To manually trigger this on the product instance, enter the **license smart sync** {**all**| **local**} privileged EXEC command. This synchronizes the product instance with CSLU, to send and receive any pending data.) CSLU forwards the RUM report to CSSM and retrieves the ACK. The ACK is applied to the product instance the next time the product instance contacts CSLU.

    - CSLU-initiated communication: In the CSLU interface, collect usage from the product instance: Collecting Usage Reports: CSLU Initiated (CSLU Interface), on page 79. CSLU sends the RUM report to CSSM and retrieves the ACK from CSSM. The ACK is applied to the product instance the next time CSLU runs an update.

- Connected Directly to CSSM: No action required. Since the product instance initiates communication, it automatically sends out the RUM report at the scheduled time, as per the policy (**show license status** —> `Next report push`), to CSSM. (To manually trigger this on the product instance, enter the **license smart sync** {**all**| **local**} privileged EXEC command. This synchronizes the product instance with CSSM, to send and receive any pending data.) Once the ACK is available, CSSM sends this back to the product instance.

- CSLU Disconnected from CSSM

    - Product Instance-initiated communication: No action required. Since the product instance initiates communication, it automatically sends out the RUM report at the scheduled time, as per the policy (**show license status** —> `Next report push`), to CSLU. (To manually trigger this on the product instance, enter the **license smart sync** {**all**| **local**} privileged EXEC command. This synchronizes the product instance with CSLU, to send and receive any pending data.)

      Since CSLU is disconnected from CSSM, in the CSLU interface and then the CSSM Web UI, complete these tasks Export to Cisco SSM (CSLU Interface), on page 80 > Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124 > Import from Cisco SSM (CSLU Interface), on page 81. The ACK is applied to the product instance the next time the product instance contacts CSLU.

    - CSLU-initiated communication: In the CSLU interface, collect usage from the product instance: Collecting Usage Reports: CSLU Initiated (CSLU Interface), on page 79.

      Since CSLU is disconnected from CSSM, in the CSLU interface and then the CSSM Web UI, complete these tasks Export to Cisco SSM (CSLU Interface), on page 80 > Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124 > Import from Cisco SSM (CSLU Interface), on page 81. The ACK is applied to the product instance the next time CSLU runs an update.

- Connected to CSSM Through a Controller: No action is required (if you have already completed the first ad hoc report in the Cisco DNA Center GUI). Cisco DNA Center handles all subsequent reporting and returns the ACK to the product instance.

- No Connectivity to CSSM and No CSLU: Save RUM reports to a file (on your product instance) and upload it to CSSM (from a workstation that has connectivity to the Internet, and Cisco). Enter the **license smart save usage** command in privileged EXEC mode, to save RUM reports to a file. Then to upload the file to CSSM and download the ACK, complete this task: Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124. Lastly, to install the ACK on the product instance, complete this task: Installing a File on the Product Instance, on page 125.

- SSM On-Prem Deployment:

    - Product Instance-initiated communication: No action required. Since the product instance initiates communication, it automatically sends out the RUM report at the scheduled time, as per the policy (**show license status** —> `Next report push`), to SSM On-Prem. (To manually trigger this on the product instance, enter the **license smart sync** {**all**| **local**} privileged EXEC command. This synchronizes the product instance with SSM On-Prem, to send and receive any pending data.)

- If SSM On-Prem is connected to CSSM, in the SSM On-Prem interface, navigate to **Reports** > **Usage Schedules** > **Synchronization schedule with Cisco**.
- If SSM On-Prem is disconnected from CSSM, upload and download the required files for reporting: Exporting and Importing Usage Data (SSM On-Prem UI), on page 99.

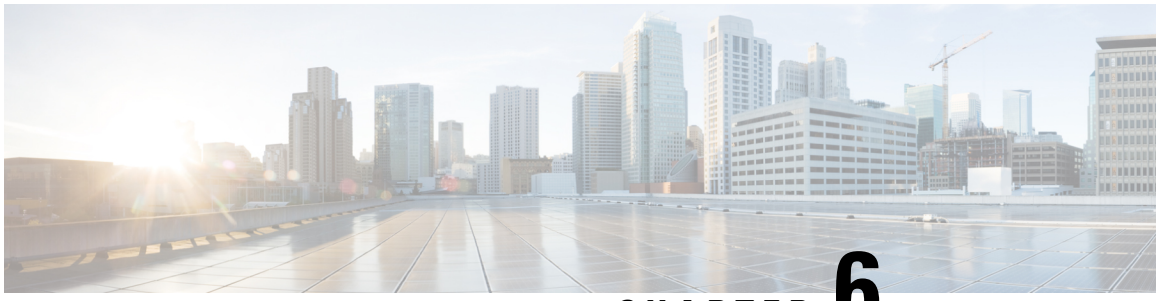
- SSM On-Prem initiated communication: In the SSM On-Prem interface, collect usage information from the product instance. Navigate to **Reports** > **Synchronisation pull schedule with the devices** > **Synchronise now with the device**.
  - If SSM On-Prem is connected to CSSM, in the SSM On-Prem interface, navigate to **Reports** > **Usage Schedules** > **Synchronization schedule with Cisco**.
  - If SSM On-Prem is disconnected from CSSM, upload and download the required files for reporting: Exporting and Importing Usage Data (SSM On-Prem UI), on page 99.

Sample Resource Utilization Measurement Report

The following is a sample Resource Utilization Measurement (RUM) report, in XML format (See RUM Report and Report Acknowledgement, on page 5). Several such reports may be concatenated to form one report.

```
<?xml version="1.0" encoding="UTF-8"?>
  <smartLicense>
```

```
  </smartLicense>
```



CHAPTER 6

Command Reference for Smart Licensing Using Policy

This chapter describes the commands used to configure Smart Licensing Using Policy for Cisco Catalyst 9000 Series Switches.

license air level

To configure AIR licenses on a wireless controller that is connected to Cisco Catalyst Access, Core, and Aggregation Switches, enter the **license air level** command in global configuration mode. To revert to the default setting, use the **no** form of this command.

license air level { **air-network-advantage** [**addon air-dna-advantage**] | **air-network-essentials** [**addon air-dna-essentials**] }

no license air level

Syntax Description

air-network-advantage	Configures the AIR network advantage license level.
addon air-dna-advantage	(Optional) Configures the add-on AIR DNA advantage license level. This add-on option is available with the AIR network advantage license, and is the default license.
air-network-essentials	Configures the AIR network essential license level.
addon air-dna-essentials	(Optional) Configures the add-on AIR DNA essentials license level. This add-on option is available with the AIR network essential license.

Command Default

AIR DNA Advantage is the default license

Command Modes

Global configuration (Device(config)#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	This command continues to be available and applicable with the introduction of Smart Licensing Using Policy in this release. See the *Usage Guidelines* section below for details.

Usage Guidelines

In the Smart Licensing Using Policy environment, you can use the **license air level** command to change the license level being used on the product instance, or to additionally configure an add-on license on the product instance. The change is effective after a reload.

The licenses that can be configured are:

- AIR Network Essential
- AIR Network Advantage
- AIR DNA Essential
- AIR DNA Advantage

You can configure AIR DNA Essential or AIR DNA Advantage license level, and on term expiry, you can move to the Network Advantage or Network Essentials license level, if you do not want to renew the DNA license.

Every connecting Access Point requires a Cisco DNA Center License to leverage the unique value properties of the controller.

For more information, see the Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide for the required release.

Examples

The following example shows how to configure the AIR DNA Essential license level:

```
Device# configure terminal
Device(config)# license air level network-essentials addon air-dna-essentials
```

The following example shows how to configure the AIR DNA Advantage license level:

```
Device# configure terminal
Device(config)# license air level air-network-advantage addon air-dna-advantage
```

license boot level

To boot a new software license on the device, use the **license boot level** command in global configuration mode. Use the **no** form of this command to remove all software licenses from the device.

license boot level { **network-advantage** [**addon dna-advantage**] | **network-essentials** [**addon dna-essentials**] }

no license boot level

Syntax Description

network-advantage [**addon dna-advantage**]	Configures the Network Advantage license. Optionally, you can also configure the Digital Networking Architecture (DNA) Advantage license.
network-essentials [**addon dna-essentials**]	Configures the Network Essentials license. Optionally, you can also configure the Digital Networking Architecture (DNA) Essentials license.

Command Default

Network Essentials

Command Modes

Global configuration (config)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	This command continues to be available and applicable with the introduction of Smart Licensing Using Policy in this release. See the *Usage Guidelines* section below for details.

Usage Guidelines

The software features available on Cisco Catalyst 9000 Series Switches fall under these base or add-on license levels:

Base Licenses:

- Network Advantage—Includes features available with the Network Essentials license and more.

Add-on Licenses:

- DNA Advantage—Includes features available with the Network Essentials license and more.

Base licenses are permanent or perpetual licenses.

Add-on licenses are subscription or term licenses and can be purchased for a three, five, or seven year period. Base licenses are a prerequite for add-on licenses. See the release notes for more information about this.

The sections below provide information about using the **license boot level** command in the earlier Smart Licensing environment, and in the Smart Licensing Using Policy environment.

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, Smart Licensing is enabled by default and you can use the **license boot level** command for these purposes:

- Downgrade or upgrade licenses
- Enable or disable an evaluation or extension license
- Clear an upgrade license

This command forces the licensing infrastructure to boot the configured license level instead of the license hierarchy maintained by the licensing infrastructure for a given module:

- When the switch reloads, the licensing infrastructure checks the configuration in the startup configuration for licenses, if any. If there is a license in the configuration, the switch boots with that license. If there is no license, the licensing infrastructure follows the image hierarchy to check for licenses.
- If the forced boot evaluation license expires, the licensing infrastructure follows the regular hierarchy to check for licenses.
- If the configured boot license has already expired, the licensing infrastructure follows the hierarchy to check for licenses.

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, Smart Licensing Using Policy is enabled by default and you can use the **license boot level** command for these purposes:

- To change the base or add-on license levels being used on the product instance.

  For example, if you are using Network Essentials and you want to use Network Advantage with the next reload, or if you are using DNA Advantage and you want to use DNA Essentials with the next reload.

- To add or remove add-on license levels being used on the product instance.

  For example, if you are using only Network Essentials and you want to use DNA Essentials with the next reload, or if you are using DNA Advantage and you do not want to use the add-on after the next reload.

The notion of evaluation or expired licenses does not exist in Smart Licensing Using Policy.

After the command is configured, the configured license is effective after the next reload. License usage continues to be recorded on device and this changed licensing consmption information may have to be sent via the next Resource Utilization Measurement Report (RUM report), to CSSM. The reporting requirements and frequency are determined by the policy that is applied. See the `Usage Reporting:` section of the **show license status** command output. For more information about Smart Licensing Using Policy, in the software configuration guide of the required release, see *System Management* > *Smart Licensing Using Policy*.

Examples

The following example shows how to configure the Network Essentials license at the next reload:

```
Device# configure terminal
Device(config)# license boot level network-essentals
Device(config)# exit
Device# copy running-config startup-config
Device# reload
```

The following example shows how to activate the DNA Essentials license at the next reload:

```
Device# configure terminal
Device(config)# license boot level network-essentals add-on dna-essentials
Device(config)# exit
Device# copy running-config startup-config
Device# reload
```

license smart (global config)

To configure licensing-related settings such as the mode of transport and the URL that the product instance uses to communicate with Cisco Smart Software Manager (CSSM), or Cisco Smart Licensing Utility (CSLU), or Smart Software Manager On-Prem (SSM On-Prem), to configure the usage reporting interval, to configure the information that must be exluded or included in a license usage report (RUM report), enter the **license smart** command in global configuration mode. Use the **no** form of the command to revert to default values.

license smart { **custom_id** *ID* | **enable** | **privacy** { **all** | **hostname** | **version** } | **proxy** { **address** *address_hostname* | **port** *port* } | **reservation** | **server-identity-check** | **transport** { **automatic** | **callhome** | **cslu** | **off** | **smart** } | **url** { *url* | **cslu** *cslu_or_on-prem_url* | **default** | **smart** *smart_url* | **utility** *secondary_url* } | **usage** { **customer-tags** { **tag1** | **tag2** | **tag3** | **tag4** } *tag_value* | **interval** *interval_in_days* } | **utility** [**customer_info** { **city** *city* | **country** *country* | **postalcode** *postalcode* | **state** *state* | **street** *street* }] }

no license smart { **custom_id** | **enable** | **privacy** { **all** | **hostname** | **version** } | **proxy** { **address** *address_hostname* | **port** *port* } | **reservation** | **server-identity-check** | **transport** | **url** { *url* | **cslu** *cslu_or_on-prem_url* | **default** | **smart** *smart_url* | **utility** *secondary_url* } | **usage** { **customer-tags** { **tag1** | **tag2** | **tag3** | **tag4** } *tag_value* | **interval** *interval_in_days* } | **utility** [**customer_info** { **city** *city* | **country** *country* | **postalcode** *postalcode* | **state** *state* | **street** *street* }] }

Syntax Description

custom_id *ID*	Although available on the CLI, this option is not supported.
enable	Although visible on the CLI, configuring this keyword has no effect. Smart licensing is always enabled.

privacy { **all** | **hostname** | **version** }	Sets a privacy flag to prevent the sending of the specified data privacy related information. When the flag is disabled, the corresponding information is sent in a message or offline file created by the product instance. Depending on the topology this is sent to one or more components, including CSSM, CSLU, and SSM On-Prem. *All data privacy settings are disabled by default*. You must configure the option you want to exclude from all communication: • **all**: All data privacy related information is excluded from any communication. The **no** form of the command causes all data privacy related information to be sent in a message or offline file. **Note** The Product ID (PID) and serial number are *included in the RUM report* regardless of whether data privacy is enabled or not. • **hostname**: Excludes hostname information from any communication. When hostname privacy is enabled, the *UDI* of the product instance is displayed on the applicable user interfaces (CSSM, CSLU, and SSM On-Prem). The **no** form of the command causes hostname information to be sent in a message or offline file. The hostname is displayed on the applicable user interfaces (CSSM, CSLU, and SSM On-Prem). • **version**: Excludes the Cisco IOS-XE software version running on the product instance and the Smart Agent version from any communication. The **no** form of the command causes version information to be sent in a message or offline file.

proxy { **address** *address_hostname* | **port** *port* }	Configures a proxy for license usage synchronization with CSLU or CSSM. This means that you can use this option to configure a proxy only if the transport mode is **license smart transport smart** (CSSM), or **license smart transport cslu** (CSLU). However, you cannot configure a proxy for license usage synchronization in an SSM On-Prem deployment, which also uses **license smart transport cslu** as the transport mode. Configure the following options: • **address** *address_hostname*: Configures the proxy address. For *address_hostname*, enter the enter the IP address or hostname of the proxy. • **port***port*: Configures the proxy port. For *port*, enter the proxy port number.
reservation	Enables or disables a license reservation feature. **Note** Although available on the CLI, this option is not applicable because license *reservation* is not applicable in the Smart Licensing Using Policy environment.
server-identity-check	Enables or disables the HTTP secure server identity check.
transport { **automatic** | **callhome** | **cslu** | **off** | **smart** }	Configures the mode of transport the product instance uses to communicate with CSSM. Choose from the following options: • **automatic**: Sets the transport mode **cslu**. • **callhome**: Enables Call Home as the transport mode. • **cslu**: Enables CSLU as the transport mode. This is the default transport mode. The same keyword applies to both CSLU *and* SSM On-Prem, but the URLs are different. See **cslu***cslu_or_on-prem_url* in the following row. • **off**: Disables all communication from the product instance. • **smart**: Enables Smart transport.

url { *url* | **cslu** *cslu_url* | **default** | **smart** *smart_url* | **utility** *secondary_url* }

Sets a URL for the configured transport mode. Choose from the following options:

- *url*: If you have configured the transport mode as **callhome**, configure this option. Enter the CSSM URL exactly as follows:

  `https://tools.cisco.com/its/service/oddce/services/DDCEService`

  The **no license smart url** *url* command reverts to the default URL.

- **cslu** *cslu_or_on-prem_url*: If you have configured the transport mode as **cslu**, configure this option, with the URL for CSLU or SSM On-Prem, as applicable:

  - If you are using CSLU, enter the URL as follows:

    `http://<cslu_ip_or_host>:8182/cslu/v1/pi`

    For `<cslu_ip_or_host>`, enter the hostname or the IP address of the windows host where you have installed CSLU. 8182 is the port number and it is the only port number that CSLU uses.

    The **no license smart url cslu** *cslu_or_on-prem_url* command reverts to `http://cslu-local:8182/cslu/v1/pi`

  - If you are using SSM On-Prem, enter the URL as follows:

    `http://<ip>/cslu/v1/pi/<tenant ID>`

    For <ip>, enter the hostname or the IP address of the server where you have installed SSM On-Prem. The <tenantID> must be the default local virtual account ID.

    Tip You can retrieve the entire URL from SSM On-Prem. In the software configuration guide of the required release (17.3.x onwards), see *System Management > Smart Licensing Using Policy* > Task Library for Smart Licensing Using Policy > Retrieving the Transport URL (SSM On-Prem UI).

    The **no license smart url cslu** *cslu_or_on-prem_url* command reverts to `http://cslu-local:8182/cslu/v1/pi`

- **default**: Depends on the configured transport mode. Only the **smart** and **cslu** transport modes are supported with this option.

  If the transport mode is set to **cslu**, and you configure **license smart url default**, the CSLU URL is

configured automatically (`https://cslu-local:8182/cslu/v1/pi`).

If the transport mode is set to **smart**, and you configure **license smart url default**, the Smart URL is configured automatically (`https://smartreceiver.cisco.com/licservice/license`).

- **smart** *smart_url*: If you have configured the transport type as **smart**, configure this option. Enter the URL exactly as follows:

  `https://smartreceiver.cisco.com/licservice/license`

  When you configure this option, the system automatically creates a duplicate of the URL in **license smart url** *url*. You can ignore the duplicate entry, no further action is required.

  The **no license smart url smart***smart_url* command reverts to the default URL.

- **utility** *smart_url*: Although available on the CLI, this option is not supported.

usage { **customer-tags** { **tag1** | **tag2** | **tag3** | **tag4** } *tag_value* | **interval** *interval_in_days* }	Configures usage reporting settings. You can set the following options: • **customer-tags** { **tag1** | **tag2** | **tag3** | **tag4** } *tag_value*: Defines strings for inclusion in data models, for telemetry. Up to 4 strings (or tags) may be defined. For *tag_value*, enter the string value for each tag that you define. • **interval** *interval_in_days*: Sets the reporting interval in days. By default the RUM report is sent every 30 days. The valid value range is 1 to 3650. If you set the value to zero, RUM reports are not sent, regardless of what the applied policy specifies - this applies to topologies where CSLU or CSSM may be on the receiving end. If you set a value that is greater than zero and the transport type is set to **off**, then, between the *interval_in_days* and the policy value for `Ongoing reporting frequency(days):`, the lower of the two values is applied. For example, if *interval_in_days* is set to 100, and the value in the in the policy says `Ongoing reporting frequency (days):90`, RUM reports are sent every 90 days. If you do not set an interval, and the default is effective, the reporting interval is determined entirely by the policy value. For example, if the default value is effective and only unenforced licenses are in use, if the policy states that reporting is not required, then RUM reports are not sent.
utility [**customer_info** { **city** *city* | **country** *country* | **postalcode** *postalcode* | **state** *state* | **street** *street* }]	Although visible on the CLI, this option is not supported on any of the Cisco Catalyst Access, Core, and Aggregation Switches.

Command Default

Cisco IOS XE Amsterdam 17.3.1 or earlier: Smart Licensing is enabled by default

Cisco IOS XE Amsterdam 17.3.2a and later: Smart Licensing Using Policy is enabled by default.

Command Modes

Global config (Device(config)#)

Command History

Release	Modification
	This command was introduced.

Release	Modification
Cisco IOS XE Amsterdam 17.3.2a	The following keywords and variables were introduced with Smart Licensing Using Policy: • Under the **url**keyword, these options were introduced: { **cslu** *cslu_url* | **smart** *smart_url* } • Under the **transport** keyword, these options were introduced: { **cslu** | **off** } Further, the default transport type was changed from **callhome**, to **cslu**. • **usage** { **customer-tags** { **tag1** | **tag2** | **tag3** | **tag4** } *tag_value* | **interval** *interval_in_days* } The following keywords and variables under the **license smart** global command are deprecated and no longer available on the CLI: **enable**and **conversion automatic**.
Cisco IOS XE Amsterdam 17.3.3	SSM On-Prem support was introduced. For product instance-initiated communication in an SSM On-Prem deployment, the existing [**no**]**license smart url cslu***cslu_or_on-prem_url* command supports the configuration of a URL for SSM On-Prem as well. But the required URL format for SSM On-Prem is: `http://<ip>/cslu/v1/pi/<tenant ID>`. The corresponding transport mode that must be configured is also an existing command (**license smart transport cslu**).
Cisco IOS XE Cupertino 17.7.1	If version privacy is disabled (**no license smart privacy version** global configuration command), the Cisco IOS-XE software version running on the product instance and the Smart Agent version is *included* in the RUM report. To exclude version information from the RUM report, version privacy must be enabled (**license smart privacy version**).
Cisco IOS XE Cupertino 17.9.1	• Support for sending hostname information was introduced. If the privacy setting for the hostname is disabled (**no license smart privacy hostname** global configuration command), hostname information is sent from the product instance, in a separate sync message, or offline file. Depending on the topology you have implemented, the hostname information is received by CSSM, CSLU, or SSM On-Prem. It is also displayed on the corresponding user interface. • A new mechanism to send all data privacy related information was introduced. This information is no longer included in a RUM report. If data privacy is disabled (**no license smart privacy** {**all** | **hostname** | **version**} global configuration command), data privacy related information is sent in a separate sync message or offline file.

Usage Guidelines

Data Privacy Settings

When you disable a privacy setting, the topology you have implemented determines the recipient and how the information reaches its destination:

- The recipient of the information may be one or more of the following: CSSM, CSLU, and SSM On-Prem. The privacy setting has no effect on a controller (Cisco DNA Center).

  In case of the **hostname** keyword, after the hostname information is received by CSSM, CSLU, or SSM On-Prem, it is also displayed on the corresponding UIs – as applicable. If you then *enable* privacy the corresponding UIs revert to displaying the UDI of the product instance.

- How the information is sent.

  - In case of a topology where the product instance initiates communication, the product instance initiates the sending of this information in a message, to CSSM, or CSLU, or SSM On-Prem.

    The product instance sends the hostname sent every time one of the following events occur: the product instance boots up, the hostname changes, there is a switchover in a High Availability set-up.

  - In case of a topology where CSLU or SSM On-Prem initiate communication, the corresponding component initiates the retrieval of privacy information from the product instance.

    The hostname is retrieved at the frequency you configure in CSLU or SSM On-Prem, to retrieve information.

  - In case of a topology where the product instance is in an air-gapped network, privacy information is included in the offline file that is generated when you enter the **license smart save usage** privileged EXEC command.

Note For all topologies, data privacy related information is *not* included in the RUM report.

Data privacy related information it is not stored by the product instance *prior* to sending or saving. This ensures that if and when information is sent, it is consistent with the data privacy setting at the time of sending or saving.

Communication failure and reporting

The reporting interval that you configure (**license smart usage interval** *interval_in_days* command), determines the date and time at which the product instance sends out the RUM report. If the scheduled interval coincides with a communication failure, the product instance attempts to send out the RUM report for up to four hours after the scheduled time has expired. If it is still unable to send out the report (because the communication failure persists), the system resets the interval to 15 minutes. Once the communication failure is resolved, the system reverts the reporting interval to the value that you last configured.

The system message you may see in case of a communicatin failure is %SMART_LIC-3-COMM_FAILED. For information about resolving this error and restoring the reporting interval value, in the software configuration guide of the required release (17.3.x onwards), see *System Management > Smart Licensing Using Policy > Troubleshooting Smart Licensing Using Policy*.

Proxy server acceptance

When configuring the **license smart proxy** {**address** *address_hostname* | **port***port*} command, note the change in the criteria for the acceptance of proxy servers, starting with Cisco IOS XE Bengaluru 17.6.1: only the status code of the proxy server response is verified by the system and not the reason phrase. The RFC

format is `status-line = HTTP-version SP status-code SP reason-phrase CRLF`, where the status code is a three-digit numeric code. For more information about the status line, see section 3.1.2 of RFC 7230.

- Examples for Data Privacy, on page 148
- Examples for Transport Type and URL, on page 149
- Examples for Usage Reporting Options, on page 149

Examples for Data Privacy

The following examples show how to configure data privacy related information using **license smart privacy** command in global configuration mode. The accompanying **show license status** output displays configured information.

Note The output of the **show** command only tells you if a particular option is enabled or disabled.

Here, no data privacy related information information is sent:

```
Device# configure terminal
Device(config)# license smart privacy all
Device(config)# exit
Device# show license status
<output truncated>
Data Privacy:
  Sending Hostname: no
    Callhome hostname privacy: ENABLED
    Smart Licensing hostname privacy: ENABLED
  Version privacy: ENABLED

Transport:
  Type: Callhome
<output truncated>
```

Here, hostname is included and version information is excluded in the message initiated from the product instance. The product instance is directly connected to CSSM (transport type is **smart**, with the corresponding URL).

```
Device# configure terminal
Device(config)# license smart privacy version
Device(config)# no license smart privacy hostname
Device(config)# exit

Device# show license all
<output truncated>

Data Privacy:
  Sending Hostname: no
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: ENABLED
  Version privacy: DISABLED

Transport:
  Type: Smart
  URL: https://smartreceiver.cisco.com/licservice/license
  Proxy:
    Not Configured
```

```
  VRF:
    Not Configured

<output truncated>
```

Examples for Transport Type and URL

The following examples show how to configure some of the transport types using the **license smart transport** and the **license smart url** commands in global configuration mode. The accompanying **show license all** output displays configured information.

Transport: **cslu**:

```
Device# configure terminal
Device(config)# license smart transport cslu
Device(config)# license smart url default
Device(config)# exit
Device# show license all
<output truncated>
Transport:
  Type: cslu
  Cslu address: http://192.168.0.1:8182/cslu/v1/pi
  Proxy:
    Not Configured
<output truncated>
```

Transport: **smart**:

```
Device# configure terminal
Device(config)# license smart transport smart
Device(config)# license smart url smart https://smartreceiver.cisco.com/licservice/license
Device(config)# exit
Device# show license all
<output truncated>
Transport:
  Type: Smart
  URL: https://smartreceiver-stage.cisco.com/licservice/license
  Proxy:
    Not Configured
<output truncated>
```

Examples for Usage Reporting Options

The following examples show how to configure some of the usage reporting settings using the **license smart usage** command in global configuration mode. The accompanying **show running-config** output displays configured information.

Configuring the **customer-tag** option:

```
Device# configure terminal
Device(config)# license smart usage customer-tags tag1 SA/VA:01
Device(config)# exit
Device# show running-config | include tag1
license smart usage customer-tags tag1 SA/VA:01
```

Configuring a narrower reporting interval than the currently applied policy:

```
Device# show license status
<output truncated>
Usage Reporting:
Last ACK received: Sep 22 13:49:38 2020 PST
Next ACK deadline: Dec 21 12:02:21 2020 PST
Reporting push interval: 30 days
```

```
Next ACK push check: Sep 22 12:20:34 2020 PST
Next report push: Oct 22 12:05:43 2020 PST
Last report push: Sep 22 12:05:43 2020 PST
Last report file write: <none>
<output truncated>

Device# configure terminal
Device(config)# license smart usage interval 20
Device(config)# exit
Device# show license status
<output truncated>

Usage Reporting:
Last ACK received: Sep 22 13:49:38 2020 PST
Next ACK deadline: Nov 22 12:02:21 2020 PST
Reporting push interval: 20 days
Next ACK push check: Sep 22 12:20:34 2020 PST
Next report push: Oct 12 12:05:43 2020 PST
Last report push: Sep 22 12:05:43 2020 PST
Last report file write: <none>
<output truncated>
```

license smart (privileged EXEC)

To configure licensing functions such as requesting or returning authorization codes, saving Resource Utilization Measurement reports (RUM reports), importing a file on to a product instance, establishing trust with Cisco Smart Software Manager (CSSM), synchronizing the product instance with CSSM, or Cisco Smart License Utility (CSLU), or Smart Software Manager On-Prem (SSM On-Prem), and removing licensing information from the product instance, enter the **license smart** command in privileged EXEC mode with the corresponding keyword or argument.

license smart { **authorization** { **request** { **add** | **replace** | **save** *path* } *feature_name* { **all** | **local** } | **return** { **all** | **local** } { **offline** [*path*] | **online** } } | **clear eventlog** | **export return** { **all** | **local** } *feature_name* | **factory reset** | **import** *file_path* | **save** { **trust-request** *filepath_filename* | **usage** { **all** | **days** *days* | **rum-id** *rum-ID* | **unreported** } { **file** *file_path* } } | **sync** { **all** | **local** } | **trust idtoken** *id_token_value* { **local** | **all** } [**force**] }

Syntax Description

smart	Provides options for Smart Licensing.
authorization	Provides the option to request for, or return, authorization codes. Authorization codes are required *only* if you use licenses with enforcement type: export-controlled or enfored.
request	Requests an authorization code from CSSM, CSLU (CSLU in-turn fetches it from CSSM), or SSM On-Prem and installs it on the product instance.
add	Adds the requested license to the existing authorization code. The new authorization code will contain all the licenses of the existing authorization code and the requested license.

replace	Replaces the existing authorization code. The new authorization code will contain only the requested license. All licenses in the current authorization code are returned. When you enter this option, the product instance verifies if licenses that correspond to the authorization codes that will be removed, are in-use. If licenses are being used, an error message tells you to first disable the corresponding features.
save *filepath_filename*	Saves the authorization code request to a file. For *filepath_filename*, specify the absolute path to the file, including the filename.
feature_name	Name of the license for which you are requesting an authorization code.
all	Performs the action for all product instances in a High Availability or stacking set-up.
local	Performs the action for the *active* product instance. This is the default option.
return	Returns an authorization code back to the license pool in CSSM.
offline *filepath_filename*	Means the product instance is not connected to CSSM. The authorization code is returned offline. This option requires you to print the return code to a file. Optionally, you can also specify a path to save the file. The file format can be any readable format, such as `.txt` If you choose the offline option, you must complete the additional step of copying the return code from the CLI or the saved file and entering it in CSSM.
online	Means that the product instance is in a connected mode. The authorization code is returned to CSLU or CSSM directly.
clear eventlog	Clears all event log files from the product instance.
export return	Although visible on the CLI, this command is not applicable in the Smart Licensing Using Policy environment. Use the **license smart authorization return** privileged EXEC command to return an authorization code instead.
factory reset	Clears all saved licensing information from the product instance.
import *filepath_filename*	Imports a file on to the product instance. The file may be that of an authorization code, a trust code, or, or a policy. For *filepath_filename*, specify the location, including the filename.
save	Provides options to save RUM reports or trust code requests.
trust-request *filepath_filename*	Saves the trust code request for the active product instance in the specified location. For *filepath_filename*, specify the absolute path to the file, including the filename.

usage { **all** | **days** *days* | **rum-id** *rum-ID* | **unreported** } { **file** *file_path* }	Saves RUM reports (license usage information) in the specified location. You must specify one of these options: • **all**: Saves all RUM reports. • **days** *days*: Saves RUM report for the last *n* number of days (excluding the current day). Enter a number. The valid range is 0 to 4294967295. For example, if you enter 3, RUM reports of the last three days are saved. • **rum-Id** *rum-ID*: Saves a specified RUM ID. The valid value range is 0 to 18446744073709551615. • **unreported**: Saves all unreported RUM reports. **file** *filepath_filename*: Saves the specified usage information to a file. Specify the absolute path to the file, including the filename.
sync { **all** | **local** }	Synchronizes with CSSM or CSLU, or SSM On-Prem, to send and receive any pending data. This includes uploading pending RUM reports, downloading the ACK response, any pending authorization codes, trust codes, and policies for the product instance. Specify the product instance by entering one of these options: • **all**: Performs synchronization for all the product instances in a High Availability or stacking set-up. If you choose this option, the product instance also sends the list of all the UDIs in the synchronization request. • **local**: Performs synchronization only for the active product instance sending the request, that is, its own UDI. This is the default option.
trust idtoken *id_token_value*	Establishes a trusted connection with CSSM. To use this option, you must first generate a token in the CSSM portal. Provide the generated token value for *id_token_value*.
force	Submits a trust code request even if a trust code already exists on the product instance. A trust code is node-locked to the UDI of a product instance. If the UDI is already registered, CSSM does not allow a new registration for the same UDI. Entering the **force** keyword overrides this behavior.

Command Default

Cisco IOS XE Amsterdam 17.3.1 and earlier: Smart Licensing is enabled by default.

Cisco IOS XE Amsterdam 17.3.2a and later: Smart Licensing Using Policy is enabled by default.

Command Modes

Privileged EXEC (Device#)

Command History

Release	Modification
	This command was introduced.

Release	Modification
Cisco IOS XE Amsterdam 17.3.2a	The following keywords and variables were introduced with Smart Licensing Using Policy: • **authorization** { **request** { **add** | **replace** } *feature_name* { **all** | **local** } | **return** { **all** | **local** } { **offline** [*path*] | **online** } } • **import** *file_path* • **save** { **trust-request** *filepath_filename* | **usage** { **all** | **days** *days* | **rum-id** *rum-ID* | **unreported** } { **file** *file_path* } } • **sync** { **all** | **local** } • **trust idtoken** *id_token_value* { **local** | **all** } [**force**] The following keywords and variables under the **license smart** command are deprecated and no longer available on the CLI: • **register idtoken** *token_id* [**force**] • **deregister** • **renew id** { **ID** | **auth** } • **debug** { **error** | **debug** | **trace** | **all** } • **mfg reservation** { **request** | **install** | **install file** | **cancel** } • **conversion** { **start** | **stop** }
Cisco IOS XE Amsterdam 17.3.3	Support for SSM On-Prem was introduced. You can perform licensing-related tasks such as saving Resource Utilization Measurement reports (RUM reports), importing a file on to a product instance, synchronizing the product instance, returning authorization codes, and removing licensing information from the product instance in an SSM On-Prem deployment.
Cisco IOS XE Bengaluru 17.6.2	Support for the Export Control Key for High Security (HSECK9 key) was introduced on the Cisco Catalyst 9300X Series Switches. The authorization code related commands (**license smart authorization request** and **license smart authorization return**) can be used to request and return the Smart Licensing Authorization Code (SLAC) for the HSECK9 key, on supported platforms.
Cisco IOS XE Cupertino 17.7.1	The following enhancements were introduced in this release: • The **save** *path* keyword and variable were added to the **license smart authorization request** command string. You can use this option to generate a SLAC request and save it to a file. The new options are displayed as follows: **license smart authorization request** { **add** | **replace** | **save** *path* } *feature_name* { **all** | **local** } *request_count* • The existing **license smart save usage** command was enhanced to automatically include a trust code request if it doesn't already exist.

Release	Modification
Cisco IOS XE Cupertino 17.8.1	The authorization code related commands (**license smart authorization request** and **license smart authorization return**) were implemented on the following products: • Cisco Catalyst 9600 Series 40-Port 50G, 2-Port 200G, 2-Port 400G Line Card (C9600-LC-40YL4CD) • Cisco Catalyst 9500X Series Switches You can use the above commands to request and return the Smart Licensing Authorization Code (SLAC) for the HSECK9 key on supported platforms.
Cisco IOS XE Dublin 17.11.1	The HSECK9 key was implemented on Cisco Catalyst 9400 Series Supervisor 2 and 2XL Modules (C9400X-SUP-2 and C9400X-SUP-2XL) The authorization code related commands (**license smart authorization request** and **license smart authorization return**) can be used to request and return the Smart Licensing Authorization Code (SLAC) for the HSECK9 key, on supported platforms.

Usage Guidelines

Requesting a Trust Code in an Air-Gapped Network

Starting with Cisco IOS XE Cupertino 17.7.1 if a trust code is not available on the product instance, the product instance automatically includes a trust code request in the RUM report when you enter the **license smart save usage** command. This is supported in a standalone set-up, as well as a High Availability and stacking set-up. In a a High Availability and stacking set-up, the active product instance requests and installs the trust code for all members or standbys where a trust code is missing. CSSM includes the trust code in the ACK which is available for download from the CSSM Web UI. You then have to install the ACK on the product instance. You can verify trust code installation by entering the **show license status** command in privileged EXEC mode - check for the updated timestamp in the `Trust Code Installed` field.

Overwriting a Trust Code

Use cases for the **force** option when configuring the **license smart trust idtoken** command:

- You use same token for all the product instances that are part of one Virtual Account. If the product instance has moved from one account to another (for instance, because it was added to a High Availability set-up, which is part of another Virtual Account), then there may be an existing trust code you have to overwrite.
- There is already a factory-installed trust code on the product instance, but you want to implement a topology where the product instance is directly connected to CSSM. A factory-installed trust code cannot be used for secure communication with CSSM. You must generate an ID token in the CSSM Web UI and download a trust code file. When you install this new trust code, you must overwrite the existing factory-installed trust code.

Removing Licensing Information

Entering the **license smart factory reset** command removes all licensing information (except the licenses in-use) from the product instance, including any authorization codes, RUM reports etc. Therefore, we recommend the use of this command only if the product instance is being returned (Return Material Authrization, or RMA), or being decommissioned permanently. We also recommend that you return any authorization codes and send a RUM report to CSSM, before you remove licensing information from the product instance - this is to ensure that CSSM has up-to-date usage information.

Requesting and Returning Authorization Codes:

- Requesting and returning SLAC - when the product instance is connected to CSSM, or CSLU or SSM On-Prem:
  - Use the following command to request SLAC on supported product instances. In a stacking set-up, you can request SLAC for either the active (**local**), or the entire stack (**all**). You cannot request SLAC for just one member or standby. Here the product instance is connected to CSSM, or CSLU or SSM On-Prem. For air-gapped networks, you must enter the required details directly in CSSM to generated SLAC.

    license smart authorization request { **add** | **replace** } *feature_name* { **all** | **local** }

  - Use the following command to return a SLAC or an SLR authorization code:

    license smart authorization return { **all** | **local** } { **online** }

- Requesting and returning a SLAC when the product instance is in an air-gapped network.
  - Starting from Cisco IOS XE Cupertino 17.7.1

    You can request and install a SLAC without having to enter the required PIDs or generating a SLAC in the CSSM Web UI. Instead, save a SLAC request in a file by configuring the **license smart authorization request** { **add** | **replace** } *feature_name* { **all** | **local** }, followed by the **license smart authorization request save** [*path*] commands.

    Upload the SLAC request file, to the CSSM Web UI (in the same location and just as you would, a RUM report). After the request is processed, a SLAC file is available on the CSSM Web UI. Download, and import the SLAC file into the product instance.

    Similarly, to return a SLAC configure the **license smart authorization return** command with the **offline** [*path*] option to save the file. Upload the file to the CSSM Web UI in the same location and just as you would, a RUM report).

  - Prior to Cisco IOS XE Cupertino 17.7.1:

    To request SLAC on a product instance in an air-gapped network, you must enter the required details directly in the CSSM Web UI to generate SLAC.

    To return a SLAC or an SLR authorization code:

    license smart authorization return { **all** | **local** } { **offline** [*path*] | **online** }

    Copy the return code that is displayed on the CLI and enter it in CSSM. If you save the return code to a file, you can copy the code from the file and enter the same in CSSM.

    For SLR authorization codes in the Smart Licensing Using Policy environment, note that you cannot request a new SLR in the Smart Licensing Using Policy environment, because the notion of "reservation" does not apply. If you are in an air-gapped network, the *No Connectivity to CSSM and No CSLU* topology applies instead.

Authorization Codes in an SSM On-Prem Deployment

When requesting SLAC in an SSM On-Prem Deployment, ensure that you meet the following prerequisites before you configure the **license smart authorization request** command:

- The product instance must be added to SSM On-Prem. The process of addition validates and maps the product instance to the applicable Smart Account and Virtual account in CSSM.

- The authorization codes required for export-controlled and enfored licenses must be generated in CSSM and imported into SSM On-Prem.

Examples

- Example for Requesting SLAC (Connected Directly to CSSM), on page 156
- Example for Saving Licensing Usage Information, on page 157
- Example for Installing a Trust Code, on page 157
- Example for Returning an SLR Authorization Code, on page 158

Example for Requesting SLAC (Connected Directly to CSSM)

The following example shows how you can request and install SLAC on a product instance that is directly connected to CSSM. This example is of a stacking set-up with an active, a standby, and a member - all the devices in the stack are C9300X and support the HSECK9 key and IPSec. IPsec is a cryptographic feature which requires the HSECK9 key. A SLAC is requested for all the product instances in the set-up.

```
Device# license smart authorization request add hseck9 all
Device#
Oct 19 15:49:47.888: %SMART_LIC-6-AUTHORIZATION_INSTALL_SUCCESS: A new licensing authorization
 code was successfully installed on PID:C9300X-24HX,SN:FOC2519L8R7
Oct 19 15:49:47.946: %SMART_LIC-6-AUTHORIZATION_INSTALL_SUCCESS: A new licensing authorization
 code was successfully installed on PID:C9300X-48HXN,SN:FOC2524L39P
Oct 19 15:49:48.011: %SMART_LIC-6-AUTHORIZATION_INSTALL_SUCCESS: A new licensing authorization
 code was successfully installed on PID:C9300X-48HX,SN:FOC2516LC92

Device# show license authorization
Overall status:
  Active: PID:C9300X-24HX,SN:FOC2519L8R7
      Status: SMART AUTHORIZATION INSTALLED on Oct 19 15:49:47 2021 UTC
      Last Confirmation code: 4e740fb8
  Standby: PID:C9300X-48HXN,SN:FOC2524L39P
      Status: SMART AUTHORIZATION INSTALLED on Oct 19 15:49:47 2021 UTC
      Last Confirmation code: 086d28d7
  Member: PID:C9300X-48HX,SN:FOC2516LC92
      Status: SMART AUTHORIZATION INSTALLED on Oct 19 15:49:48 2021 UTC
      Last Confirmation code: beb51aa1

Authorizations:
  C9K HSEC (Cat9K HSEC):
    Description: HSEC Key for Export Compliance on Cat9K Series Switches
    Total available count: 3
    Enforcement type: EXPORT RESTRICTED
    Term information:
      Active: PID:C9300X-24HX,SN:FOC2519L8R7
        Authorization type: SMART AUTHORIZATION INSTALLED
        License type: PERPETUAL
          Term Count: 1
      Standby: PID:C9300X-48HXN,SN:FOC2524L39P
        Authorization type: SMART AUTHORIZATION INSTALLED
        License type: PERPETUAL
          Term Count: 1
      Member: PID:C9300X-48HX,SN:FOC2516LC92
        Authorization type: SMART AUTHORIZATION INSTALLED
        License type: PERPETUAL
          Term Count: 1
```

```
Purchased Licenses:
  No Purchase Information Available
```

Example: Requesting a SLAC and Returning a SLAC (No Connectivity to CSSM and No CSLU)

The following examples show you how to generate and save a SLAC request on the product instance and also how to return a SLAC to the CSSM Web UI, for a product instance in an air-gapped network. The software version running on the product instance is Cisco IOS XE Cupertino 17.7.1, which introduces support for a more simplified way of requesting and returning SLAC in an air-gapped network.

Requesting a SLAC

```
Device# license smart authorization request add hseck9 local
Device# license smart authorization request save bootflash:slac-request.txt
```

After the above steps, upload the file to the CSSM Web UI. From the CSSM Web UI, download the file containing the SLAC. To import and install the file on the product instance, enter the following commands:

```
Device# copy tftp://10.8.0.6/user01/slac_code.txt bootflash:
Device# license smart import bootflash:slac_code.txt
```

Returning a SLAC

```
Device# license smart authorization return local offline bootflash:auth_return.txt
```

After the above step, upload the file to the CSSM Web UI. A file is available for download after this, but import and installation of this file is optional.

Example for Saving Licensing Usage Information

The following example shows how you can save license usage information on the product instance. You can use this option to fulfil reporting requirements in an air-gapped network. In the example, the file is first save to flash memory and then copied to a TFTP location:

```
 Device> enable
Device# license smart save usage unreported file flash:RUM-unrep.txt
Device# copy flash:RUM-unrep.txt tftp://192.168.0.1//auto/tftp-user/user01/
Address or name of remote host [192.168.0.1]?
Destination filename [//auto/tftp-user/user01/RUM-unrep.txt]?
!!
15128 bytes copied in 0.161 secs (93963 bytes/sec)
```

After you save RUM reports to a file, you must upload it to CSSM (from a workstation that has connectivity to the internet, and Cisco).

Example for Installing a Trust Code

The following example shows how to install a trust code even if one is already installed on the product instance. This requires connectivity to CSSM. The accompanying **show license status** output shows sample output after successful installation:

Before you can install a trust code, you must generate a token and download the corresponding file from CSSM.

Use the **show license status** command (`Trust Code Installed:`) to verify results.

```
Device> enable
Device# license smart trust idtoken
```

```
NGMwMjk5mYtNZaxMS00NzMZmtgWm local force
Device# show license status
<output truncated>
Trust Code Installed:
  Active: PID:C9500-24Y4C,SN:CAT2344L4GH
    INSTALLED on Sep 04 01:01:46 2020 EDT
  Standby: PID:C9500-24Y4C,SN:CAT2344L4GJ
    INSTALLED on Sep 04 01:01:46 2020 EDT
<output truncated>
```

Example for Returning an SLR Authorization Code

The following example shows how to remove and return an SLR authorization code. Here the code is returned offline (no connectivity to CSSM). The accompanying **show license all** output shows sample output after successful return:

```
Device> enable
Device# license smart authorization return local offline
Enter this return code in Cisco Smart Software Manager portal:
UDI: PID:C9500-16X,SN:FCW2233A5ZV
Return code: Cr9JHx-L1x5Rj-ftwzg1-h9QZAU-LE5DT1-babWeL-FABPt9-Wr1Dn7-Rp7
Device# configure terminal
Device(config)# no license smart reservation

Device# show license all
<output truncated>
License Authorizations
======================
Overall status:
  Active: UDI: PID:C9500-16X,SN:FCW2233A5ZV
      Status: NOT INSTALLED
      Last return code: Cr9JHx-L1x5Rj-ftwzg1-h9QZAU-LE5DT1-babWeL-FABPt9-Wr1Dn7-Rp7
<output truncated>
```

Since the product instance is in an air-gapped network, you must copy the return code from the CLI, locate the product instance in the CSSM Web UI and enter the return code there to complete the return process.

show license all

To display all licensing information enter the **show license all** command in privileged EXEC mode. This command displays status, authorization, UDI, and usage information, all combined.

show license all

Syntax Description

This command has no arguments or keywords.

Command Default

Privileged EXEC (#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	Command output was updated to display information relating to Smart Licensing Using Policy. Command output no longer displays Smart Account and Virtual account information.

Release	Modification
Cisco IOS XE Cupertino 17.7.1	The output of the command was enhanced to display the following information: • RUM report statistics, in section `Usage Report Summary`. • Smart Account and Virtual Account information, in section `Account Information`.

Usage Guidelines

This command concatenates the output of other show license commands, enabling you to display different kinds of licensing information together. For field descriptions, refer to the corresponding commands.

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, command output displays fields pertinent to Smart Licensing (whether smart licensing is enabled, all associated licensing certificates, compliance status, and so on).

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, command output displays fields pertinent to Smart Licensing Using Policy.

- The `Smart Licensing Status` section corresponds with the output of the **show license status** command.
- The `License Usage` section corresponds with the output of the **show license usage** command.
- The `Product Information` section corresponds with the output of the **show license udi** command.
- The `Agent Version` section of the show license all command displays the Smart Agent version and is available only in this command.
- The `License Authorizations` section corresponds with the output of the **show license authorization** command.
- The `Usage Report Summary` section corresponds with the output in the **show license tech** command.

Examples

- show license all for Smart Licensing Using Policy (Cisco Catalyst 9300 Series Switches), on page 159
- show license all for Smart Licensing Using Policy (Cisco Catalyst 9500 Series Switches), on page 162

show license all for Smart Licensing Using Policy (Cisco Catalyst 9300 Series Switches)

The following is sample output of the **show license all** command in a stacking set-up. All the product instances in the stack are C9300X switches, which support the Export Control Key for High Security (HSECK9) starting from Cisco IOS XE Bengaluru 17.6.2. An HSECK9 key is used here and the requisite Smart Licensing Authorization Code (SLAC) is installed (SMART AUTHORIZATION INSTALLED on Oct 29 17:45:28 2021 UTC).

```
Device# show license all

Smart Licensing Status
======================
```

```
Smart Licensing is ENABLED

Export Authorization Key:
  Features Authorized:
    <none>

Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: cslu
  Cslu address: <empty>
  Proxy:
    Not Configured

Miscellaneous:
  Custom Id: <empty>

Policy:
  Policy in use: Installed On Oct 29 17:44:15 2021 UTC
  Policy name: Custom Policy
  Reporting ACK required: yes (Customer Policy)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (Customer Policy)
    Reporting frequency (days): 0 (Customer Policy)
    Report on change (days): 90 (Customer Policy)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (Customer Policy)
    Reporting frequency (days): 90 (Customer Policy)
    Report on change (days): 90 (Customer Policy)
  Enforced (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 90 (Customer Policy)
    Report on change (days): 90 (Customer Policy)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 90 (Customer Policy)
    Report on change (days): 90 (Customer Policy)

Usage Reporting:
  Last ACK received: Oct 29 17:48:51 2021 UTC
  Next ACK deadline: Jan 27 17:48:51 2022 UTC
  Reporting push interval: 30  days
  Next ACK push check: <none>
  Next report push: Oct 29 18:32:43 2021 UTC
  Last report push: Oct 29 17:44:50 2021 UTC
  Last report file write: <none>

Trust Code Installed:
  Active: PID:C9300X-24HX,SN:FOC2519L8R7
    INSTALLED on Oct 29 17:44:15 2021 UTC
  Standby: PID:C9300X-48HXN,SN:FOC2524L39P
    INSTALLED on Oct 29 17:44:15 2021 UTC
  Member: PID:C9300X-48HX,SN:FOC2516LC92
    INSTALLED on Oct 29 17:44:15 2021 UTC
```

```
License Usage
=============

network-advantage (C9300-24 Network Advantage):
  Description: C9300-24 Network Advantage
  Count: 1
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: C9300-24 Network Advantage
  Enforcement type: NOT ENFORCED
  License type: Perpetual

dna-advantage (C9300-24 DNA Advantage):
  Description: C9300-24 DNA Advantage
  Count: 1
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage
  Feature Description: C9300-24 DNA Advantage
  Enforcement type: NOT ENFORCED
  License type: Subscription

network-advantage (C9300-48 Network Advantage):
  Description: C9300-48 Network Advantage
  Count: 2
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: C9300-48 Network Advantage
  Enforcement type: NOT ENFORCED
  License type: Perpetual

dna-advantage (C9300-48 DNA Advantage):
  Description: C9300-48 DNA Advantage
  Count: 2
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage
  Feature Description: C9300-48 DNA Advantage
  Enforcement type: NOT ENFORCED
  License type: Subscription

hseck9 (Cat9K HSEC):
  Description: hseck9
  Count: 1
  Version: 1.0
  Status: IN USE
  Export status: RESTRICTED - ALLOWED
  Feature Name: hseck9
  Feature Description: hseck9
  Enforcement type: EXPORT RESTRICTED
  License type: Perpetual

Product Information
===================
UDI: PID:C9300X-24HX,SN:FOC2519L8R7

HA UDI List:
```

```
    Active:PID:C9300X-24HX,SN:FOC2519L8R7
    Standby:PID:C9300X-48HXN,SN:FOC2524L39P
    Member:PID:C9300X-48HX,SN:FOC2516LC92

Agent Version
=============
Smart Agent for Licensing: 5.1.23_rel/104

License Authorizations
======================
Overall status:
  Active: PID:C9300X-24HX,SN:FOC2519L8R7
      Status: SMART AUTHORIZATION INSTALLED on Oct 29 17:45:28 2021 UTC
      Last Confirmation code: 6746c5b5
  Standby: PID:C9300X-48HXN,SN:FOC2524L39P
      Status: NOT INSTALLED
  Member: PID:C9300X-48HX,SN:FOC2516LC92
      Status: NOT INSTALLED

Authorizations:
  C9K HSEC (Cat9K HSEC):
    Description: HSEC Key for Export Compliance on Cat9K Series Switches
    Total available count: 1
    Enforcement type: EXPORT RESTRICTED
    Term information:
      Active: PID:C9300X-24HX,SN:FOC2519L8R7
        Authorization type: SMART AUTHORIZATION INSTALLED
        License type: PERPETUAL
          Term Count: 1

Purchased Licenses:
  No Purchase Information Available
```

show license all for Smart Licensing Using Policy (Cisco Catalyst 9500 Series Switches)

The following is sample output of the **show license all** command on a Cisco Catalyst 9500 switch. The software version running on the product instance here is Cisco IOS XE Cupertino 17.7.1. Similar output is displayed on all Cisco Catalyst Access, Core, and Aggregation Switches.

```
Device# show license all

Smart Licensing Status
======================

Smart Licensing is ENABLED

Export Authorization Key:
  Features Authorized:
    <none>

Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Account Information:
  Smart Account: <none>
  Virtual Account: <none>

Data Privacy:
  Sending Hostname: no
```

```
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: ENABLED
  Version privacy: DISABLED

Transport:
  Type: Smart
  URL: https://smartreceiver.cisco.com/licservice/license
  Proxy:
    Not Configured
  VRF:
    Not Configured

Miscellaneous:
  Custom Id: <empty>

Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Enforced (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)

Usage Reporting:
  Last ACK received: <none>
  Next ACK deadline: Mar 30 22:32:22 2020 EST
  Reporting push interval: 30  days
  Next ACK push check: <none>
  Next report push: Oct 19 04:39:08 2021 EST
  Last report push: <none>
  Last report file write: <none>

Trust Code Installed: <none>

License Usage
=============

network-advantage (C9500 Network Advantage):
  Description: C9500 Network Advantage
  Count: 1
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: C9500 Network Advantage
  Enforcement type: NOT ENFORCED
  License type: Perpetual

dna-advantage (C9500-40X DNA Advantage):
  Description: C9500-40X DNA Advantage
  Count: 1
  Version: 1.0
```

```
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage
  Feature Description: C9500-40X DNA Advantage
  Enforcement type: NOT ENFORCED
  License type: Subscription

Product Information
===================
UDI: PID:C9500-40X,SN:FCW2227A4NC

Agent Version
=============
Smart Agent for Licensing: 5.3.9_rel/22

License Authorizations
======================
Overall status:
  Active: PID:C9500-40X,SN:FCW2227A4NC
      Status: NOT INSTALLED

Purchased Licenses:
  No Purchase Information Available


Derived Licenses:
  Entitlement Tag:
regid.2017-03.com.cisco.advantagek9-Nyquist-C9500,1.0_f1563759-2e03-4a4c-bec5-5feec525a12c
  Entitlement Tag:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9

Usage Report Summary:
=====================
Total: 26,  Purged: 0
Total Acknowledged Received: 0,  Waiting for Ack: 0
Available to Report: 26  Collecting Data: 2
```

Related Commands

Command	Description
show license status	Displays compliance status of a license.
show license authorization	Displays authorization code-related information.
show license summary	Displays summary of all active licenses.
show license udi	Displays UDI.
show license usage	Displays license usage information
show license tech support	Displays the debug output.

show license authorization

To display authorization-related information for (export-controlled and enforced) licenses, enter the **show license authorization** command in privileged EXEC mode.

show license authorization

This command has no arguments or keywords.

Command Modes

Privileged EXEC (Device#)

Command History

Release	Modification
Cisco IOS XE Amsterdam 17.3.2a	This command was introduced.

Usage Guidelines

Use this command to display information about authorization codes. This includes SLR authorization codes and Smart Licensing Authorization Codes (SLAC).

Examples

For information about fields shown in the display, see Table 12: show license authorization Field Descriptions, on page 165 .

For sample outputs, see:

- Displaying SLAC, on page 167
- Displaying SLR Authorization Code, on page 167.

Table 12: show license authorization Field Descriptions

Field		Description
Overall Status	Header for UDI information for all product instances in the set-up, the type of authorization that is installed, and configuration errors, if any. In a High Availability set-up, all UDIs in the set-up are listed.	
	Active: Status:	The active product instance UDI, followed by the status of the authorization code installation for this UDI. If the status indicates that the authorization code is installed and there is a confirmation code, this is also displayed.
	Standby: Status:	The standby product instance UDI, followed by the status of the authorization code installation for this UDI. If the status indicates that the authorization code is installed and there is a confirmation code, this is also displayed.
	Member: Status:	The member product instance UDI, followed by the status of the authorization code installation for this UDI. If the status indicates that the authorization code is installed and there is a confirmation code, this is also displayed.
	ERROR:	Configuration errors or discrepancies in the High Availability set-up, if any.

Field		Description
Authorizations	Header for detailed license authorization information. All licenses, their enforcement types, and validity durations are displayed. Errors are displayed for each product instance if its authorization or mode does not match what is installed on the active. This section is displayed only if the product instance is using a license with an authorization code.	
	():	License name and a shortened form of the license name.
	Description	License description.
	Total available count:	Total count of licenses that are *available* to consume. This includes licenses of all durations (perpetual and subscription), including expired subscription licenses, for all the product instances in a High Availability setup.
	Enforcement type	Enforcement type for the license. This may be one of the following: • Enforced • Not enforced • Export-Controlled
	Term information:	Header providing license duration information. The following fields maybe included under this header: • Active: The active product instance UDI, followed by the status of the authorization code installation for this UDI. • Authorization type: Type of authorization code installed and date of installation. The type can be: SLAC, UNIVERSAL, SPECIFIED, PAK, RTU. • Start Date: Displays validity start date if the license is for a specific term or time period. • Start Date: Displays validity end date if the license is for a specific term or time period. • Term Count: License count. • Subscription ID: Displays ID if the license is for a specific term or time period. • License type: License duration. This can be: SUBSCRIPTION or PERPETUAL. • Standby: The standby product instance UDI, followed by the status of the authorization code installation for this UDI. • Member: The member product instance UDI, followed by the status of the authorization code installation for this UDI.

Field		Description
Purchased Licenses	Header for license purchase information.	
	Active:	The active product instance and its the UDI.
	Count:	License count.
	Description:	License description.
	License type:	License duration. This can be: SUBSCRIPTION or PERPETUAL.
	Standby:	The standby product instance UDI.
	Member:	The member product instance UDI.

Displaying SLAC

The following is sample output of the **show license authorization** command on a C9300X model switch. Here SLAC is installed only on the active product instance in a stacking set-up:

```
Device# show license authorization
Overall status:
  Active: PID:C9300X-24HX,SN:FOC2519L8R7
      Status: SMART AUTHORIZATION INSTALLED on Oct 29 17:45:28 2021 UTC
      Last Confirmation code: 6746c5b5
  Standby: PID:C9300X-48HXN,SN:FOC2524L39P
      Status: NOT INSTALLED
  Member: PID:C9300X-48HX,SN:FOC2516LC92
      Status: NOT INSTALLED

Authorizations:
  C9K HSEC (Cat9K HSEC):
    Description: HSEC Key for Export Compliance on Cat9K Series Switches
    Total available count: 1
    Enforcement type: EXPORT RESTRICTED
    Term information:
      Active: PID:C9300X-24HX,SN:FOC2519L8R7
        Authorization type: SMART AUTHORIZATION INSTALLED
        License type: PERPETUAL
          Term Count: 1

Purchased Licenses:
  No Purchase Information Available
```

Displaying SLR Authorization Code

The following is sample output of the **show license authorization** command showing SLR authorization codes (`Last Confirmation code:`). An SLR authorization code is supported after upgrade to Smart Licensing Using Policy. While existing SLRs are carried over after upgrade, you cannot request a new SLR in the Smart Licensing Using Policy environment. If you are in an air-gapped network, the *No Connectivity to CSSM and No CSLU* topology applies instead.

```
Device# show license authorization

Overall status:
  Active: PID:C9500-16X,SN:FCW2233A5ZV
```

```
      Status: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
      Last Confirmation code: 184ba6d6
  Standby: PID:C9500-16X,SN:FCW2233A5ZY
      Status: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
      Last Confirmation code: 961d598f

Specified license reservations:
  C9500 Network Advantage (C9500 Network Advantage):
    Description: C9500 Network Advantage
    Total reserved count: 2
    Enforcement type: NOT ENFORCED
    Term information:
      Active: PID:C9500-16X,SN:FCW2233A5ZV
        Authorization type: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
        License type: PERPETUAL
          Term Count: 1
      Standby: PID:C9500-16X,SN:FCW2233A5ZY
        Authorization type: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
        License type: PERPETUAL
          Term Count: 1
  C9500-DNA-16X-A (C9500-16X DNA Advantage):
    Description: C9500-DNA-16X-A
    Total reserved count: 2
    Enforcement type: NOT ENFORCED
    Term information:
      Active: PID:C9500-16X,SN:FCW2233A5ZV
        Authorization type: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
        License type: PERPETUAL
          Term Count: 1
      Standby: PID:C9500-16X,SN:FCW2233A5ZY
        Authorization type: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
        License type: PERPETUAL
          Term Count: 1

Purchased Licenses:
  No Purchase Information Available


Derived Licenses:
  Entitlement Tag:
regid.2017-03.com.cisco.advantagek9-Nyquist-C9500,1.0_f1563759-2e03-4a4c-bec5-5feec525a12c
  Entitlement Tag:
regid.2017-07.com.cisco.C9500-DNA-16X-A,1.0_ef3574d1-156b-486a-864f-9f779ff3ee49
```

show license data conversion

To display license data conversion information, enter the **show license data** command in privileged EXEC mode.

show license data conversion

Syntax Description

This command has no keywords or arguments

Command Modes Privileged EXEC (Device#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	Command output was updated to display information relating to Smart Licensing Using Policy. Command output no longer displays Smart Account and Virtual account information.

Usage Guidelines

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, command output displays fields pertinent to Smart Licensing.

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, command output displays fields pertinent to Smart Licensing Using Policy.

Device-led conversion is not supported on Cisco Catalyst Access, Core, and Aggregation Switches.

show license eventlog

To display event logs relating to Smart Licensing Using Policy, enter the **show license eventlog** command in privileged EXEC mode.

show license eventlog [*days*]

Syntax Description

days	Enter the number of days for which you want to display event logs. The valid value range is from 0 to 2147483647.

Command Modes

Privileged EXEC (Device#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	Additional events were added with the introduction of Smart Licensing Using Policy: • Installation and removal of a policy • Request, installation and removal of an authorization code. • Installation and removal of a trust code. • Addition of authorization source information for license usage.

Usage Guidelines

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, command output displays fields pertinent to Smart Licensing.

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, command output displays fields pertinent to Smart Licensing Using Policy.

Examples

show license eventlog for One Day, for Smart Licensing Using Policy, on page 170

show license eventlog for All Events, for Smart Licensing Using Policy, on page 170

show license eventlog for One Day, for Smart Licensing Using Policy

The following is sample output from the **show license eventlog** command on a Cisco Catalyst 9500 switch. Similar output is displayed on all supported Cisco Catalyst Access, Core, and Aggregation Switches. The command is configured to display events for one day.

```
Device# show license eventlog 1
**** Event Log ****

2020-09-11 00:50:17.693 EDT SAEVT_PLATFORM eventSource="INFRA_SL"
eventName="INFRA_SL_EVLOG_ERM_RESET" MSG="ERM-Reset: Client 0, AP-GROUP group, 2 features
air-network-advantage,air-dna-advantage"
2020-09-11 00:50:17.695 EDT SAEVT_ENDPOINT_USAGE count="0"
entitlementTag="regid.2018-06.com.cisco.DNA_NWStack,1.0_e7244e71-3ad5-4608-8bf0-d12f67c80896"
2020-09-11 00:50:17.695 EDT SAEVT_ENDPOINT_USAGE count="0"
entitlementTag="regid.2017-08.com.cisco.AIR-DNA-A,1.0_b6308627-3ab0-4a11-a3d9-586911a0d790"
2020-09-11 00:50:50.175 EDT SAEVT_POLL_MESSAGE messageType="LICENSE_USAGE"
2020-09-11 08:50:17.694 EDT SAEVT_PLATFORM eventSource="INFRA_SL"
eventName="INFRA_SL_EVLOG_ERM_RESET" MSG="ERM-Reset: Client 0, AP-GROUP group, 2 features
air-network-advantage,air-dna-advantage"
2020-09-11 08:50:17.696 EDT SAEVT_ENDPOINT_USAGE count="0"
entitlementTag="regid.2018-06.com.cisco.DNA_NWStack,1.0_e7244e71-3ad5-4608-8bf0-d12f67c80896"
2020-09-11 08:50:17.696 EDT SAEVT_ENDPOINT_USAGE count="0"
entitlementTag="regid.2017-08.com.cisco.AIR-DNA-A,1.0_b6308627-3ab0-4a11-a3d9-586911a0d790"
2020-09-11 08:50:52.804 EDT SAEVT_POLL_MESSAGE messageType="LICENSE_USAGE"
```

show license eventlog for All Events, for Smart Licensing Using Policy

The following is sample output from the **show license eventlog** command on a Cisco Catalyst 9500 switch. Similar output is displayed on all supported Cisco Catalyst Access, Core, and Aggregation Switches. The command is configured to display all events.

```
Device# show license eventlog

**** Event Log ****

2020-09-01 15:43:42.300 UTC SAEVT_INIT_START version="4.13.14_rel/41"
2020-09-01 15:43:42.301 UTC SAEVT_INIT_CRYPTO success="False" error="Crypto Initialization
 has not been completed"
2020-09-01 15:43:42.301 UTC SAEVT_HA_EVENT eventType="SmartAgentEvtHArmfRegister"
2020-09-01 15:43:45.055 UTC SAEVT_READY
2020-09-01 15:43:45.055 UTC SAEVT_ENABLED
2020-09-01 15:43:45.088 UTC SAEVT_PLATFORM eventSource="INFRA_SL"
eventName="INFRA_SL_EVLOG_SYSDATA_FAIL" MSG="Get-SDL: not the active switch"
2020-09-01 15:43:45.089 UTC SAEVT_PLATFORM eventSource="INFRA_SL"
eventName="INFRA_SL_EVLOG_SYSDATA_FAIL" MSG="Get-SDL: not the active switch"
2020-09-01 15:43:45.089 UTC SAEVT_PLATFORM eventSource="INFRA_SL"
eventName="INFRA_SL_EVLOG_SYSDATA_FAIL" MSG="Get-SDL: not the active switch"
2020-09-01 15:43:45.089 UTC SAEVT_LICENSE_USAGE count="0" type="destroy"
entitlementTag="regid.2018-01.com.cisco.C9500-24Y4C-A,1.0_6b065611-6552-472a-8859-ab3339550166"
2020-09-01 15:43:45.098 UTC SAEVT_PLATFORM eventSource="INFRA_SL"
eventName="INFRA_SL_EVLOG_SYSDATA_FAIL" MSG="Get-SDL: not the active switch"
```

show license history message

To display communication history between the product instance and CSSM or CSLU (as the case may be), enter the **show license history message** command in privileged EXEC mode. The output of this command is used by the technical support team, for troubleshooting.

show license history message

Syntax Description

This command has no keywords or arguments.

Command Modes

Privileged EXEC (Device#)

Command History

Release	Modification
Cisco IOS XE Amsterdam 17.3.2a	This command was introduced.

Usage Guidelines

When you encounter an error message that you are not able to resolve, along with a copy of the message that appears on the console or in the system log, provide your Cisco technical support representative with sample output of these commands: **show license tech support**, **show license history message**, and the **show platform software sl-infra all** privileged EXEC commands.

show license reservation

To display license reservation information, enter the **show license reservation** command in privileged EXEC mode.

show license reservation

This command has no arguments or keywords.

Command Modes

Privileged EXEC (Device#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	The command continues to be available on the CLI, but is no longer applicable because the notion of reserveration does not exist in the Smart Licensing Using Policy environment.

Usage Guidelines

The command continues to be available on the CLI and corresponding output is displayed, but with the introduction of Smart Licensing Using Policy, the notion of reservation is not longer applicable. Use the **show license all** command in privileged EXEC mode, to display *migrated* SLR licenses instead (the SLR authorization code is migrated to Smart Licensing Using Policy).

show license rum

To display information about Resource Utilization Measurement reports (RUM report) available on the product instance, including report IDs, the current processing state of a report, error information (if any), and to save the detailed or summarized view that is displayed, enter the **show license rum** command in privileged EXEC mode.

show license rum { **feature** { *license_name* | **all** } | **id** { *rum_id* | **all** } } [**detail**] [**save** *path*]

Syntax Description

feature { *license_name* | **all** }	Displays RUM report information based on the license name. Specify a particular license name to display all RUM reports for that license, or use the **all** keyword to display all RUM reports available on the product instance.
id { *rum_id* | **all** }	Displays RUM report information based on the RUM report ID. Specify a report ID to display information for a single report, or use the **all** keyword to display all RUM reports available on the product instance.
detail	Displays detailed RUM report information. You can use this to display detailed information by license name and detailed information by RUM report ID.
save *path*	Saves the information that is displayed. This can be the simplified or detailed version and depends on the preceeding keywords you have entered. Information about 200 RUM reports can be displayed. If there are more 200 RUM reports on the product instance, you can view information about all the RUM reports by saving it to a text (.txt) file. **Note** This option saves the information *about* RUM reports and is not for reporting purposes. It does not save the RUM report, which is an XML file containing usage information.

Command Modes

Privileged EXEC (Device#)

Command History

Release	Modification
Cisco IOS XE Cupertino 17.7.1	This command was introduced.

Usage Guidelines

A RUM report is a license usage report, which the product instance generates, to fulfil reporting requirements as specified by the policy. An acknowledgement (ACK) is a response from CSSM and provides information about the status of a RUM report. Once the ACK for a report is available on the product instance, it indicates

that the corresponding RUM report is no longer required and can be deleted. You can use the **show license rum** command to:

- Display information about the available RUM reports on the product instance - filtered by ID or license name.
- Display a short summary of the information or display a detailed view of the information.
- Track a RUM report throughout its lifecycle (from the time it is first generated until its acknowledgement from CSSM). By displaying the current processing state and condition of a report you can ascertain if and when there is a problem in the reporting workflow.
- Save the displayed information. The CLI displays information about up to 200 reports. If there are more than 200 reports on the product instance and you want to view information about all of them, save the displayed info in a .txt file and export to the desired location to view.

To display a statistical view of RUM report information (the total number of reports on the product instance, the number of reports that have a corresponding ACK, the number of reports waiting for an ACK etc.) refer to the `Usage Report Summary:` section of the **show license all** and **show license tech** privileged EXEC commands.

The **show license tech** command also provides RUM report related information that the Cisco technical support team can use to troubleshoot, if there are problems with RUM reporting.

Examples

For information about fields shown in the display, see Table 13: show license rum (simplified view) Field Descriptions, on page 173 and Table 14: show license rum (detailed view) Field Descriptions, on page 175

For examples of the **show license rum** command, see:

- show license rum feature: Simplified and Detailed View, on page 176
- Saving RUM Report View, on page 179

Table 13: show license rum (simplified view) Field Descriptions

Field Name	Description
Report Id	A numeric field that identifies a RUM report. The product instance automatically assigns an ID to every RUM report it generates. An ID may be up to 20 characters long.

Field Name	Description
State	This field displays the current processing state of a RUM report, and can be only one of the following: • OPEN: This means new measurements are being added to this report. • CLOSED: This means no further measurements can be added to this report, and the report is ready for communication to CSSM. • PENDING: This is a transitional status that you may see if you display a report while it is being transmitted. • UNACK: This means the report was transmitted and is waiting for confirmation from CSSM, that it is processed. • ACK: This means the report was processed or acknowledged by CSSM and is eligible for deletion.

Flag	Indicates the condition of the RUM report, and is displayed in the form of a character. Each character represents a specific condition, and can be only one of the following values:
	• N: Normal; This means no errors have been detected and the report is going through normal operation.
	• P: Purged; This means the report was removed due to system resource limitation, and can refer to a shortage of disk space or insufficient memory. If this flag is displayed, refer to the `State Change Reason` field in the detailed view for more information.
	• E: Error; This means an error was detected in the RUM report. If this flag is displayed, refer to the detailed view for more information. Possible workflow issues include and are not limited to the following:
	  • RUM report was dropped by CSSM. If this is the issue, the `State` field displays value `ACK`, but the `State Change Reason` does not change to `ACKED`.
	  • RUM Report data is missing. If this is the issue, the `Storage State` field displays value `MISSING` .
	  • Tracking information is missing. If this is the case the `State` field displays value `UNACK` and the `Transaction ID` field has no information.
	Note Occasional errors in RUM reports do not require any action from you and are not an indication of a problem. It is only if you see a large number of reports (greater than 10) with errors that you must contact the Cisco technical support team.

Feature Name	The name of the license that the RUM report applies to.

Table 14: show license rum (detailed view) Field Descriptions

Field Name	Description
Report Id	A numeric field that identifies a RUM report. The product instance automatically assigns an ID to every RUM report it generates. An ID may be up to 20 characters long.
Metric Name:	Shows the type of data that is recorded. For a RUM report, the only possible value is ENTITLEMENT, and refers to measurement of license usage.
Feature Name:	The name of the license that the RUM report applies to.
Metric Value	A unique identifier for the data that is recorded. This is the same as the "Entitlement Tag" in the output of the **show license tech** commad and it displays information about the license being tracked.
UDI	Composed of the Product ID (PID) and serial number of the product instance.
Previous Report Id:	ID of the previous RUM report that the product instance generated for a license.
Next Report Id:	The ID that the product instance will use for the next RUM report it generates for a llicense.
State:	Displays the current processing state of a RUM report. The value displayed here is always the same as the value displayed in the simplified view. For the list of possible values see Table 13: show license rum (simplified view) Field Descriptions, on page 173above.
State Change Reason:	Displays the reason for a RUM report state change. Not all state changes provide a reason. • NONE: This means the RUM report is going through its normal lifecycle (for instance, from OPEN → CLOSED → ACK). This state change reason is usually accompanied by an N flag (meaning Normal) in the simplified view and requires no action from you. • ACKED: RUM report was processed normally by CSSM. • REMOVED: RUM report was received and requested to be removed by CSSM. • RELOAD: RUM report state was changed due to some type of device reload. • DECONFIG: License was removed from configuration.
Start Time:	Timestamps for measurement start and measurement end for a RUM report. Together, the start time and end time provide the time duration that the measurements cover.
End Time:	

Field Name	Description
Storage State:	Displays current storage state of the RUM report and can be one of the following values: • EXIST: This means the data for the RUM report is located in storage. • DELETED: This means the data was intentionally deleted. Refer to the `Storage State Change Reason` in the output of the **show license tech** command for more information about this storage state. • PURGED: This means the data was deleted due to a system resource limitation. Refer to the `Storage State Change Reason` in the output of the **show license tech** command for more information about this storage state. • MISSING: This means data is missing from storage. If reports are identified as missing, there is no recovery process.
Transaction ID:	Contains tracking information for the RUM report. This information can be either polling information or ACK import information. The Transaction Message contains the error message, if the product instance receives one when importing an ACK. The information in these fields is used by the Cisco technical support team when troubleshooting problems with RUM reports.
Transaction Message:	

show license rum feature: Simplified and Detailed View

The following is sample output of the **show license rum feature** *license-name* and **show license rum feature** *license-name* **detail** commands on a Cisco Catalyst 9500 Series Switch. Similar output is displayed on all other Catalyst switches.

The output is filtered to display all RUM reports for the DNA Advantage license, followed by a detailed view of all RUM reports for the DNA Advantage license.

```
Device# show license rum feature dna-advantage

Smart Licensing Usage Report:
=====================================
Report Id,          State,    Flag, Feature Name
1574560487          CLOSED    N     dna-advantage
1574560489          CLOSED    N     dna-advantage
1574560491          CLOSED    N     dna-advantage
1574560493          CLOSED    N     dna-advantage
1574560495          CLOSED    N     dna-advantage
1574560497          CLOSED    N     dna-advantage
1574560499          CLOSED    N     dna-advantage
1574560501          CLOSED    N     dna-advantage
1574560503          CLOSED    N     dna-advantage
1574560505          CLOSED    N     dna-advantage
1574560507          CLOSED    N     dna-advantage
1574560509          CLOSED    N     dna-advantage
1574560511          OPEN      N     dna-advantage


Device# show license rum feature dna-advantage detail
Smart Licensing Usage Report Detail:
```

```
==================================
Report Id: 1574560487
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 0,    Next Report Id: 1574560489
  State: CLOSED,      State Change Reason: None
  Start Time: Sep 02 00:11:55 2020 EST,      End Time: Sep 02 20:12:04 2020 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560489
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560487,    Next Report Id: 1574560491
  State: CLOSED,      State Change Reason: None
  Start Time: Sep 02 20:24:46 2020 EST,      End Time: Sep 02 22:24:56 2020 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560491
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560489,    Next Report Id: 1574560493
  State: CLOSED,      State Change Reason: None
  Start Time: Sep 02 22:34:27 2020 EST,      End Time: Sep 03 14:34:37 2020 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560493
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560491,    Next Report Id: 1574560495
  State: CLOSED,      State Change Reason: None
  Start Time: Sep 03 14:45:16 2020 EST,      End Time: Sep 03 15:30:49 2020 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560495
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560493,    Next Report Id: 1574560497
  State: CLOSED,      State Change Reason: None
  Start Time: Sep 03 15:47:29 2020 EST,      End Time: Dec 21 17:02:39 2020 EST
  Storage State: EXIST
  Transaction ID: 0
```

```
  Transaction Message: <none>

Report Id: 1574560497
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560495,    Next Report Id: 1574560499
  State: CLOSED,      State Change Reason: None
  Start Time: Jan 05 14:02:34 2021 EST,      End Time: Feb 19 21:02:21 2021 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560499
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560497,    Next Report Id: 1574560501
  State: CLOSED,      State Change Reason: None
  Start Time: Feb 19 21:17:57 2021 EST,      End Time: Jul 05 14:03:07 2021 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560501
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560499,    Next Report Id: 1574560503
  State: CLOSED,      State Change Reason: None
  Start Time: Jul 05 14:19:30 2021 EST,      End Time: Jul 06 14:34:40 2021 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560503
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560501,    Next Report Id: 1574560505
  State: CLOSED,      State Change Reason: None
  Start Time: Jul 06 14:39:42 2021 EST,      End Time: Jul 06 15:10:14 2021 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560505
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560503,    Next Report Id: 1574560507
  State: CLOSED,      State Change Reason: RELOAD
  Start Time: Jul 06 15:25:36 2021 EST,      End Time: Aug 05 15:55:46 2021 EST
  Storage State: EXIST
```

```
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560507
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560505,    Next Report Id: 1574560509
  State: CLOSED,      State Change Reason: REPORTING
  Start Time: Aug 05 16:15:11 2021 EST,      End Time: Aug 05 16:15:14 2021 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560509
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560507,    Next Report Id: 1574560511
  State: CLOSED,      State Change Reason: REPORTING
  Start Time: Aug 05 16:15:14 2021 EST,      End Time: Aug 05 19:38:43 2021 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>

Report Id: 1574560511
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560509,    Next Report Id: 0
  State: OPEN,      State Change Reason: None
  Start Time: Aug 05 19:38:43 2021 EST,      End Time: Oct 18 02:53:39 2021 EST
  Storage State: EXIST
  Transaction ID: 0
  Transaction Message: <none>
```

Saving RUM Report View

The following example shows you how to save a simplified view of the **show license rum feature all** command.

By using the **feature** and **all** keywords, the output is filtered to display all RUM reports for all licenses being used on the product instance. You can then transfer it to a location from where you can open the text file and view the information.

```
Device# show license rum feature all save bootflash:all-rum-stats.txt
Device# copy bootflash:all-rum-stats.txt tftp://10.8.0.6/user01/
```

show license status

To display information about licensing settings such as data privacy, policy, transport, usage reporting and trust codes, enter the **show license status** command in privileged EXEC mode.

show license status

Syntax Description

This command has no arguments or keywords.

Command Default

Privileged EXEC (#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	Command output was updated to reflect new fields that are applicable to Smart Licensing Using Policy. This includes `Trust code installed:`, `Policy in use`, `Policy name:` , reporting requirements as in the policy, and `Usage Reporting:` . Command output no longer displays Smart Account and Virtual account information.
Cisco IOS XE Cupertino 17.7.1	Command output was updated to display Smart Account and Virtual account information.

Usage Guidelines

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, command output displays fields pertinent to Smart Licensing.

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, command output displays fields pertinent to Smart Licensing Using Policy.

Account Information in the output

Starting with Cisco IOS XE Cupertino 17.7.1, every ACK includes the Smart Account and Virtual Account that was reported to, in CSSM. When it receives the ACK, the product instance securely stores only the latest version of this information - as determined by the timestamp in the ACK. The Smart Account and Virtual Account information that is displayed in the `Account Information` section of this command's output is therefore always as per the latest available ACK on the product instance.

If a product instance is moved from one Smart Account and Virtual Account to another, the next ACK after the move will have this updated information. The output of this command is updated once this ACK is available on the product instance.

The ACK may be received directly (where the product instance is connected to CSSM), or indirectly (where the product instance is connect to CSSM through CSLU, Cisco DNA Center, or SSM On-Prem), or by manually importing the ACK (where a product instance is in an air-gapped network).

Examples

For information about fields shown in the display, see Table 15: show license status Field Descriptions for Smart Licensing Using Policy, on page 181

For sample outputs, see:

- show license status for Smart Licensing Using Policy, on page 186
- show license status for Smart Licensing, on page 187

Table 15: show license status Field Descriptions for Smart Licensing Using Policy

Field		Description
Utility	Header for utility settings that are configured on the product instance.	
	Status:	Status
	Utility report:	Last attempt:
	Customer Information:	The following fields are displayed: • Id: • Name: • Street • City: • State: • Country: • Postal Code:
Smart Licensing Using Policy:	Header for policy settings on the product instance.	
	Status:	Indicates if Smart Licensing Using Policy is enabled. Smart Licensing Using Policy is supported starting from Cisco IOS XE Amsterdam 17.3.2 and is always enabled on supported software images.
Account Information:	Header for account information that the product instance belongs to, in CSSM. This section is displayed only if the software version on the product instance is Cisco IOS XE Cupertino 17.7.1 or a later release. If an ACK is not installed on the product instance, these fields display `<none>`.	
	Smart Account:	The Smart Account that the product instance is part of. This information is always as per the latest available ACK on the product instance.
	Virtual Account:	The Virtual Account that the product instance is part of. This information is always as per the latest available ACK on the product instance.

Field		Description
Data Privacy:	Header for privacy settings that are configured on the product instance.	
	Sending Hostname:	A *yes* or *no* value which shows if the hostname is sent in usage reports.
	Callhome hostname privacy:	Indicates if the Call Home feature is configured as the mode of transport for reporting. If configured, one of these values is displayed: • ENABLED • DISABLED
	Smart Licensing hostname privacy:	One of these values is displayed: • ENABLED • DISABLED
	Version privacy:	One of these values is displayed: • ENABLED • DISABLED
Transport:	Header for transport settings that are configured on the product instance.	
	Type:	Mode of transport that is in use. Additional fields are displayed for certain transport modes. For example, if transport type is set to CSLU, the CSLU address is also displayed.

Field		Description
Policy:	Header for policy information that is applicable to the product instance.	
	Policy in use:	Policy that is applied This can be one of the following: Cisco default, Product default, Permanent License Reservation, Specific License Reservation, PAK license, Installed on <date>, Controller.
	Policy name:	Name of the policy
	Reporting ACK required:	A *yes* or *no* value which specifies if the report for this product instance requires CSSM acknowledgement (ACK) or not. The default policy is always set to "yes".
	Unenforced/Non-Export Perpetual Attributes	Displays policy values for perpetual licenses. • First report requirement (days): The maximum amount of time available before the first report must be sent, followed by policy name. • Reporting frequency (days): The maximum amount of time available before the subsequent report must be sent, followed by policy name. • Report on change (days): he maximum amount of time available to send a report in case of a change in license usage, followed by policy name
	Unenforced/Non-Export Subscription Attributes	Displays policy values for subscription licenses. • First report requirement (days): The maximum amount of time available before the first report must be sent, followed by policy name. • Reporting frequency (days): The maximum amount of time available before the subsequent report must be sent, followed by policy name. • Report on change (days): he maximum amount of time available to send a report in case of a change in license usage, followed by policy name
	Enforced (Perpetual/Subscription) License Attributes	

Field		Description
		Displays policy values for enforced licenses. • First report requirement (days): The maximum amount of time available before the first report must be sent, followed by policy name. • Reporting frequency (days): The maximum amount of time available before the subsequent report must be sent, followed by policy name. • Report on change (days): The maximum amount of time available to send a report in case of a change in license usage, followed by policy name
	Export (Perpetual/Subscription) License Attributes	Displays policy values for export-controlled licenses. • First report requirement (days): The maximum amount of time available before the first report must be sent, followed by policy name. • Reporting frequency (days): The maximum amount of time available before the subsequent report must be sent, followed by policy name. • Report on change (days): The maximum amount of time available to send a report in case of a change in license usage, followed by policy name
Miscellaneous	Header for custom ID.	
	Custom Id:	ID

Field		Description
Usage Reporting:	Header for usage reporting (RUM reports) information.	
	Last ACK received:	Date and time of last ACK received, in the local time zone.
	Next ACK deadline:	Date and time for next ACK. If the policy states that an ACK is not requires then this field displays `none`. **Note** If an ACK is required and is not received by this deadline, a syslog is displayed.
	Reporting Interval:	Reporting interval in days The value displayed here depends on what you configure in the **license smart usage interval***interval_in_days* and the policy value. For more information, see the corresponding Syntax Description: Table 15: show license status Field Descriptions for Smart Licensing Using Policy, on page 181.
	Next ACK push check:	Date and time when the product instance will submit the next polling request for an ACK. Date and time are in the local time zone. This applies only to product instance- initiated communication to CSSM or CSLU. If the reporting interval is zero, or if no ACK polling is pending, then this field displays `none`.
	Next report push:	Date and time when the product instance will send the next RUM report. Date and time are in the local time zone. If the reporting interval is zero, or if there are no pending RUM reports, then this field displays `none`.
	Last report push:	Date and time for when the product instance sent the last RUM report. Date and time are in the local time zone.
	Last report file write:	Date and time for when the product instance last saved an offline RUM report. Date and time are in the local time zone.
	Last report pull:	Date and time for when usage reporting information was retrieved using data models. Date and time are in the local time zone.

Field		Description
Trust Code Installed:	Header for trust code-related information. Displays date and time if trust code is installed. Date and time are in the local time zone. If a trust code is not installed, then this field displays `none`.	
	Active:	Active product instance. In a High Availability set-up, the the UDIs of all product instances in the set-up, along with corresponding trust code installation dates and times are displayed.
	Standby:	Standby product instance.
	Member:	Member product instance

show license status for Smart Licensing Using Policy

The following is sample output of the **show license status** command on a Cisco Catalyst 9500 switch where the software version running on the product instance is Cisco IOS XE Cupertino 17.7.1. Note the Smart Account and Virtual Account fields in the output starting from this release.

An ACK has not been installed on this product instance (Last ACK received: <none>). The account information fields therefore display `<none>`:

```
Device# show license status

Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Account Information:
  Smart Account: <none>
  Virtual Account: <none>

Data Privacy:
  Sending Hostname: no
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: ENABLED
  Version privacy: DISABLED

Transport:
  Type: Smart
  URL: https://smartreceiver.cisco.com/licservice/license
  Proxy:
    Not Configured
  VRF:
    Not Configured

Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
```

```
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Enforced (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)

Miscellaneous:
  Custom Id: <empty>

Usage Reporting:
  Last ACK received: <none>
  Next ACK deadline: Mar 30 22:32:22 2020 EST
  Reporting push interval: 30  days
  Next ACK push check: <none>
  Next report push: Oct 21 04:39:08 2021 EST
  Last report push: <none>
  Last report file write: <none>

Trust Code Installed: <none>
```

show license status for Smart Licensing

The following is sample output of the **show license status** command.

```
Device# show license status

Smart Licensing is ENABLED

Utility:
  Status: DISABLED

Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: Callhome

Registration:
  Status: REGISTERED
  Smart Account: Cisco Systems
  Virtual Account: NPR
  Export-Controlled Functionality: Allowed
  Initial Registration: First Attempt Pending
  Last Renewal Attempt: SUCCEEDED on Jul 19 14:49:49 2018 IST
  Next Renewal Attempt: Jan 15 14:49:47 2019 IST
  Registration Expires: Jul 19 14:43:47 2019 IST

License Authorization:
  Status: AUTHORIZED on Jul 28 07:02:56 2018 IST
  Last Communication Attempt: SUCCEEDED on Jul 28 07:02:56 2018 IST
  Next Communication Attempt: Aug 27 07:02:56 2018 IST
  Communication Deadline: Oct 26 06:57:50 2018 IST
```

Related Commands

Command	Description
show license all	Displays entitlements information.
show license authorization	Displays authorization code-related information.
show license summary	Displays summary of all active licenses.
show license udi	Displays UDI.
show license usage	Displays license usage information
show tech-support license	Displays the debug output.

show license summary

To display a brief summary of license usage, which includes information about licenses being used, the count, and status, use the **show license summary** command in privileged EXEC mode.

show license summary

Syntax Description

This command has no arguments or keywords.

Command Default

Privileged EXEC (#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	Command output was updated to reflect valid license status for Smart Licensing Using Policy. Valid license statuses are now only `IN USE`, `NOT IN USE`, `NOT AUTHORIZED`. Command output was also updated to remove registration and authorization information. Command output no longer displays Smart Account and Virtual account information.
Cisco IOS XE Cupertino 17.7.1	Command output was updated to display Smart Account and Virtual account information.

Usage Guidelines

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, command output displays fields pertinent to Smart Licensing.

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, command output displays fields pertinent to Smart Licensing Using Policy.

License status

- The **unenforced licenses** that are available on Cisco Catalyst Access, Core, and Aggregation Switches are never `NOT AUTHORIZED` or `NOT IN USE`.
- The **export-controlled license**, Export Control Key for High Security (HSECK9 key), which is supported on the switches listed below, displays status `NOT IN USE` if an HSECK9 key is available on the product instance and the requisite Smart Licensing Authorization Code (SLAC) is installed, but the cryptographic feature that requires the HSECK9 key is not configured.
  - Cisco Catalyst 9300X Series Switches, from Cisco IOS XE Bengaluru 17.6.2
  - Cisco Catalyst 9600 Series 40-Port 50G, 2-Port 200G, 2-Port 400G Line Card (C9600-LC-40YL4CD) from Cisco IOS XE Cupertino 17.8.1
  - Cisco Catalyst 9500X Series Switches from Cisco IOS XE Cupertino 17.8.1

  Configure the applicable cryptographic feature for the count and status fields to change to 1 and IN USE respectively.

For more detailed license usage information, see the output of the **show license usage** privileged EXEC command.

Usage Count

In a stacking setup, even if you install SLAC on more than one device, the usage count remains 1. This is because only one HSECK9 key is used at a given point in time - the one on the active. The license on the standby comes into effect when a switchover occurs. The count remains 1 with the new active as well, because it is still only one HSECK9 key that is being used.

In case of a modular chassis, the usage count must display only 1 because only one HSECK9 key is required for each chassis UDI - regardless of the number of supervisors installed.

Account information in the output

Starting with Cisco IOS XE Cupertino 17.7.1, every ACK includes the Smart Account and Virtual Account that was reported to, in CSSM. When it receives the ACK, the product instance securely stores only the latest version of this information - as determined by the timestamp in the ACK. The Smart Account and Virtual Account information that is displayed in the `Account Information` section of this command's output is therefore always as per the latest available ACK on the product instance.

If a product instance is moved from one Smart Account and Virtual Account to another, the next ACK after the move will have this updated information. The output of this command is updated once this ACK is available on the product instance.

The ACK may be received directly (where the product instance is connected to CSSM), or indirectly (where the product instance is connect to CSSM through CSLU, Cisco DNA Center, or SSM On-Prem), or by manually importing the ACK (where a product instance is in an air-gapped network).

Examples

For information about fields shown in the display, see Table 16: show license summary Field Descriptions for Smart Licensing Using Policy, on page 190

For sample outputs, see:

- show license summary (Cisco Catalyst 9500 Series Switches), on page 190
- show license summary (Cisco Catalyst 9300X Series Switches), on page 190

Table 16: show license summary Field Descriptions for Smart Licensing Using Policy

Field	Description
Account Information: Smart Account: Virtual Account:	The Smart Account and Virtual Account that the product instance is part of. This information is always as per the latest available ACK on the product instance. This field is displayed only if the software version on the product instance is Cisco IOS XE Cupertino 17.7.1 or a later release. If an ACK is not installed on the product instance, these fields display `<none>`.
License	Name of the licenses in use
Entitlement Tag	Short name for license
Count	License count
Status	License status can be one of the following • In-Use: Valid license, and in-use. • Not In-Use: An HSECK9 key is available on the product instance and the requisite Smart Licensing Authorization Code (SLAC) is installed, but the cryptographic feature that requires the HSECK9 key is disabled or not configured. This status is a prerequisite when you want to *return* the SLAC for an HSECK9 license to CSSM. • Not Authorized: Means that the license requires installation of SLAC before use.

show license summary (Cisco Catalyst 9500 Series Switches)

The following is sample output of the **show license summary** command, on a product instance where the software version is Cisco IOS XE Cupertino 17.7.1. Note the account information fields displayed from this release onwards:

```
Device# show license summary

Account Information:
  Smart Account: Eg-SA
  Virtual Account: Eg-VA

License Usage:
  License                Entitlement Tag               Count Status
  -----------------------------------------------------------------------------
  network-advantage_250M  (ESR_P_250M_A)                   1 IN USE
  dna-advantage_250M      (DNA_P_250M_A)                   1 IN USE
```

show license summary (Cisco Catalyst 9300X Series Switches)

The following are sample outputs of the **show license summary** command, on a C9300X stack.

The Status and Count columns here, display `NOT IN USE` and `0` for the HSECK9 key. This means the HSECK9 key is available and SLAC is installed, but the cryptographic feature that requires the license is not configured:

```
Device# show license summary
License Usage:
  License                 Entitlement Tag               Count Status
  -----------------------------------------------------------------------------
  network-advantage       (C9300-24 Network Advan...)       1 IN USE
  dna-advantage           (C9300-24 DNA Advantage)          1 IN USE
  network-advantage       (C9300-48 Network Advan...)       2 IN USE
  dna-advantage           (C9300-48 DNA Advantage)          2 IN USE
  C9K HSEC                (Cat9K HSEC)                      0 NOT IN USE
```

The Status and Count columns here display `IN USE` and `1` for the HSECK9 key. This means the cryptographic feature, which requires an HSECK9 key, is configured.

```
Device# show license summary
License Usage:
  License                 Entitlement Tag               Count Status
  -----------------------------------------------------------------------------
  network-advantage       (C9300-24 Network Advan...)       1 IN USE
  dna-advantage           (C9300-24 DNA Advantage)          1 IN USE
  network-advantage       (C9300-48 Network Advan...)       2 IN USE
  dna-advantage           (C9300-48 DNA Advantage)          2 IN USE
  hseck9                  (Cat9K HSEC)                      1 IN USE
```

show license tech

To display licensing information to help the technical support team troubleshoot a problem, enter the **show license tech** command in privileged EXEC mode. The output for this command includes outputs of several other **show license** commands and more.

show license tech { **message** | **rum** { **feature** { *license_name* | **all** } | **id** { *rum_id* | **all** } } [**detail**] [**save** *path*] | **support** }

Syntax Description

message	Displays messages concerning trust establishment, usage reporting, result polling, authorization code requests and returns, and trust synchronization. This is the same information as displayed in the output of the **show license history message** command.
rum { **feature** { *license_name* | **all** } | **id** { *rum_id* | **all** } } [**detail**] [**save** *path*]	Displays information about Resource Utilization Measurement reports (RUM reports) on the product instance, including report IDs, the current processing state of a report, error information (if any), and an option save the displayed RUM report information. **Note** This option saves the information *about* RUM reports and is not for reporting purposes. It does not save the RUM report, which is an XML file containing usage information.
support	Displays licensing information that helps the technical support team to debug a problem.

Command Modes

Privileged EXEC (Device#)

Command History

Release	Modification
	This command was introduced.

Release	Modification
Cisco IOS XE Amsterdam 17.3.2a	Command output was updated to reflect new fields that are applicable to Smart Licensing Using Policy.
Cisco IOS XE Cupertino 17.7.1	The **rum** keyword and additional options under this keyword were added: { **feature** { *license_name* | **all** } | **id** { *rum_id* | **all** } } The output of the **show license tech support** command was enhanced to display the following information: • RUM report information, in section `License Usage` and `Usage Report Summary`. • Smart Account and Virtual account information, in section `Account Information:`. The **data conversion**, **eventlog** and **reservation** keywords were removed from this command. They continue to be available as separate show commands, that is, **show license data**, **show license eventlog**, and **show license reservation** respectively.

Usage Guidelines

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, command output displays fields pertinent to Smart Licensing (whether smart licensing is enabled, all associated licensing certificates, compliance status, and so on).

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, command output displays fields pertinent to Smart Licensing Using Policy.

- Troubleshooting with a Support Representative

  When you encounter an error message that you are not able to resolve, along with a copy of the message that appears on the console or in the system log, provide your Cisco technical support representative with sample output of these commands: **show license tech support**, **show license history message**, and the **show platform software sl-infra all** privileged EXEC commands.

- RUM Report Information in the output

  - The output of the **show license tech support** command displays the following sections pertaining to RUM reports:

    Table 17: show license tech support: Field Descriptions for Header "License Usage", on page 193

```
License Usage
=============
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
      Current Value: 1
      Current Report: 1574560510       Previous: 1574560508
```

Table 17: show license tech support: Field Descriptions for Header "License Usage"

Field Name	Description
Interval:	This is a fixed measurement duration and is always 15 minutes.
Current Value:	Information about the current license count.
Current Report:	ID of the currently OPEN report for the license.
Previous:	ID of the last OPEN report for the license. This report will have state CLOSED now.

Table 18: show license tech support: Field Descriptions for Header "Usage Report Summary", on page 193

```
Usage Report Summary:
=====================
Total: 26,  Purged: 0(0)
Total Acknowledged Received: 0,  Waiting for Ack: 0(26)
Available to Report: 26  Collecting Data: 2
Maximum Display: 26  In Storage: 26,  MIA: 0(0)
```

Table 18: show license tech support: Field Descriptions for Header "Usage Report Summary"

Field Name	Description
Total:	Total number of reports that the product instance has ever generated. **Note** This total does not refer to the total number of reports *currently available* on and being tracked by the product instance. For this you must sum up the `Total Acknowledged Received:` and `Available to Report` fields.
Purged:	The number of reports deleted due to a system resource limitation. This number includes RUM reports where the product instance no longer has tracking information.
Total Acknowledged Received:	The number of RUM reports acknowledged on this product instance.
Waiting for Ack:	The number of RUM reports waiting for an ACK. This is the total number of reports in an `UNACK` state, where the product instance still has tracking information.
Available to Report:	The number of RUM reports that are available to send to CSSM. This is the total number of reports in an `OPEN` or `CLOSED` state, where the product instance still has tracking information.
Collecting Data:	Number of reports where the product instance is currently collecting measurements.

Field Name	Description
Maximum Display:	Number of reports available for display in a **show** command's output.
In Storage:	Number of reports currently stored on the disk
MIA:	The number of reports missing.

- The output of the **show license tech rum** command displays the following fields pertaining to RUM reports: Table 19: show license tech rum: Field Descriptions for Header "Smart Licensing Usage Report Detail", on page 194

  The options available under the **show license tech rum** keyword are the same as the options available with the **show license rum** privileged EXEC command. The sample output that is displayed in the *simplified view* is also the same. But if you use the **detail** keyword (for example if you enter **show license tech rum feature** *license_name* **detail**), the detailed view is displayed and this has a few *additional* fields when compared to **show license rum**.

```
Smart Licensing Usage Report Detail:
====================================
Report Id: 1574560509
  Metric Name: ENTITLEMENT
  Feature Name: dna-advantage
  Metric Value:
regid.2017-07.com.cisco.C9500-DNA-40X-A,1.0_7eb18f4c-2d44-4077-8346-818defbd9ad9
  UDI: PID:C9500-40X,SN:FCW2227A4NC
  Previous Report Id: 1574560507,    Next Report Id: 1574560511
  Version: 2.0
  State: CLOSED,      State Change Reason: REPORTING
  Start Time: Aug 05 16:15:14 2021 EST,      End Time: Aug 05 19:38:43 2021 EST
  Storage State: EXIST,  Storage State Change Reason: None
  Transaction ID: 0
  Transaction Message: <none>
  Report Size: 1086(1202)
```

Table 19: show license tech rum: Field Descriptions for Header "Smart Licensing Usage Report Detail"

Field Name	Description
Version:	Displays the format of the report during transmission. Starting with Cisco IOS XE Cupertino 17.7.1, RUM reports are stored in a new format that reduces processing time. This field indicates if the product instance is using the old format or the new format.
Storage State:	Indicates if a given report is currently in storage. In addition to the displaying the current storage state of the RUM report, with these possible values: EXIST, DELETED, PURGED, MISSING, if a "(1)" is displayed next to the label (`Storage State (1)`), this means the RUM report is in the older (pre-17.7.1 format) and will be processed accordingly. If the RUM report is in the new format, the field is displayed as `Storage State` - without any extra information.

Field Name	Description
Storage State Change Reason:	Displays the reason for the change in the storage state change. Not all state changes provide a reason. • NONE: This means no reason was recorded for the the storage state change. • PROCESSED: This means the RUM report was deleted after CISCO has processed the data. • LIMIT_STORAGE: This means the RUM report was deleted because the product instance reached it's storage limit. • LIMIT_TIME: This means the RUM report was deleted because the report reached the persisted time limit.
Transaction ID: Transaction Message:	If the transaction ID displays a correlation ID and an error status is displayed, the product instance displays the error code field in this section. If there are no errors, no data is displayed here.
Report Size	This field displays two numbers. The first number is the size of raw report for communication, in bytes. The second number is the disk space used for saving the report, also in bytes. The second number is displayed only if report is stored in the new format.

Examples

Example: show license tech support (Cisco Catalyst 9400 Series Switches)

The following is sample output from the **show license tech support** command on a Cisco Catalyst 9400 switch running software version Cisco IOS XE Cupertino 17.7.1. Similar output is displayed on all supported Cisco Catalyst Access, Core, and Aggregation Switches.

```
Device# show license tech support

Smart Licensing Tech Support info

Smart Licensing Status
======================

Smart Licensing is ENABLED

Export Authorization Key:
  Features Authorized:
    <none>

Utility:
  Status: DISABLED

Smart Licensing Using Policy:
```

```
  Status: ENABLED

Account Information:
  Smart Account: Eg-SA
  Virtual Account: Eg-VA

Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: Smart
  URL: https://smartreceiver.cisco.com/licservice/license
  Proxy:
    Address: <empty>
    Port: <empty>
    Username: <empty>
    Password: <empty>
  Server Identity Check: True
  VRF: <empty>

Miscellaneous:
  Custom Id: <empty>

Policy:
  Policy in use: Installed On Nov 20 12:10:02 2021 PDT
  Policy name: SLE Policy
  Reporting ACK required: yes (Customer Policy)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 30 (Customer Policy)
    Reporting frequency (days): 60 (Customer Policy)
    Report on change (days): 60 (Customer Policy)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 120 (Customer Policy)
    Reporting frequency (days): 111 (Customer Policy)
    Report on change (days): 111 (Customer Policy)
  Enforced (Perpetual/Subscription) License Attributes:
    First report requirement (days): 30 (Customer Policy)
    Reporting frequency (days): 90 (Customer Policy)
    Report on change (days): 60 (Customer Policy)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 30 (Customer Policy)
    Reporting frequency (days): 30 (Customer Policy)
    Report on change (days): 30 (Customer Policy)

Usage Reporting:
  Last ACK received: Dec 03 12:12:10 2021 PDT
  Next ACK deadline: Feb 01 12:12:10 2022 PDT
  Reporting push interval: 30  days State(4) InPolicy(60)
  Next ACK push check: Dec 04 04:12:06 2021 PDT
  Next report push: Dec 03 20:08:05 2021 PDT
  Last report push: Dec 03 12:08:08 2021 PDT
  Last report file write: <none>

License Usage
=============
Handle: 1
  License: network-advantage
  Entitlement Tag:
regid.2017-05.com.cisco.advantagek9-C9400,1.0_61a546cd-1037-47cb-bbe6-7cad3217a7b3
  Description: C9400 Network Advantage
  Count: 2
```

```
  Version: 1.0
  Status: IN USE(15)
  Status time: Nov 20 19:07:28 2021 PDT
  Request Time: Nov 20 19:08:05 2021 PDT
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: C9400 Network Advantage
  Enforcement type: NOT ENFORCED
  License type: Perpetual
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
      Current Value: 2
      Current Report: 1637348082       Previous: 1637348080
  Soft Enforced: True

Handle: 2
  License: dna-essentials
  Entitlement Tag:
regid.2017-05.com.cisco.dna_essentials-C9400,1.0_74d47865-1bf3-4f00-a06b-edbe18b049b3
  Description: C9400 DNA Essentials
  Count: 1
  Version: 1.0
  Status: IN USE(15)
  Status time: Nov 20 19:07:28 2021 PDT
  Request Time: Nov 20 19:07:28 2021 PDT
  Export status: NOT RESTRICTED
  Feature Name: dna-essentials
  Feature Description: C9400 DNA Essentials
  Enforcement type: NOT ENFORCED
  License type: Subscription
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
      Current Value: 1
      Current Report: 1637348083       Previous: 1637348081
  Soft Enforced: True

Handle: 7
  License: air-network-advantage
  Entitlement Tag:
regid.2018-06.com.cisco.DNA_NWStack,1.0_e7244e71-3ad5-4608-8bf0-d12f67c80896
  Description: air-network-advantage
  Count: 0
  Version: 1.0
  Status: NOT IN USE(1)
  Status time: Dec 03 20:07:35 2021 PDT
  Request Time: None
  Export status: NOT RESTRICTED
  Feature Name: air-network-advantage
  Feature Description: air-network-advantage
  Enforcement type: NOT ENFORCED
  License type: Perpetual
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
      Current Value: 0
      Current Report: 0       Previous: 0
  Soft Enforced: True

Handle: 8
  License: air-dna-advantage
  Entitlement Tag: regid.2017-08.com.cisco.AIR-DNA-A,1.0_b6308627-3ab0-4a11-a3d9-586911a0d790
```

```
  Description: air-dna-advantage
  Count: 0
  Version: 1.0
  Status: NOT IN USE(1)
  Status time: Dec 03 20:07:35 2021 PDT
  Request Time: None
  Export status: NOT RESTRICTED
  Feature Name: air-dna-advantage
  Feature Description: air-dna-advantage
  Enforcement type: NOT ENFORCED
  License type: Subscription
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
      Current Value: 0
      Current Report: 0       Previous: 0
  Soft Enforced: True

Product Information
===================
UDI: PID:C9407R,SN:FXS2119Q2U7

HA UDI List:
    Active:PID:C9407R,SN:FXS2119Q2U7
    Standby:PID:C9407R,SN:FXS2119Q2U7

Agent Version
=============
Smart Agent for Licensing: 5.3.16_rel/55

Upcoming Scheduled Jobs
=======================
Current time: Dec 03 22:58:47 2021 PDT
Daily: Dec 04 19:07:31 2021 PDT (20 hours, 8 minutes, 44 seconds remaining)
Authorization Renewal: Expired Not Rescheduled
Init Flag Check: Expired Not Rescheduled
Reservation configuration mismatch between nodes in HA mode: Expired Not Rescheduled
Retrieve data processing result: Dec 04 04:12:06 2021 PDT (5 hours, 13 minutes, 19 seconds
 remaining)
Start Utility Measurements: Dec 03 23:08:06 2021 PDT (9 minutes, 19 seconds remaining)
Send Utility RUM reports: Dec 04 20:08:05 2021 PDT (21 hours, 9 minutes, 18 seconds remaining)
Save unreported RUM Reports: Dec 03 23:53:16 2021 PDT (54 minutes, 29 seconds remaining)
Process Utility RUM reports: Dec 04 12:17:10 2021 PDT (13 hours, 18 minutes, 23 seconds
remaining)
Data Synchronization: Expired Not Rescheduled
External Event: Jan 19 11:53:19 2022 PDT (46 days, 12 hours, 54 minutes, 32 seconds remaining)
Operational Model: Expired Not Rescheduled

Communication Statistics:
=========================
Communication Level Allowed: DIRECT
Overall State: <empty>
Trust Establishment:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Trust Acknowledgement:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
```

```
Usage Reporting:
  Attempts: Total=45, Success=22, Fail=23  Ongoing Failure: Overall=1 Communication=1
  Last Response: NO REPLY on Dec 03 20:08:05 2021 PDT
    Failure Reason: <none>
  Last Success Time: Dec 03 12:08:07 2021 PDT
  Last Failure Time: Dec 03 20:08:05 2021 PDT
Result Polling:
  Attempts: Total=85, Success=25, Fail=60  Ongoing Failure: Overall=3 Communication=3
  Last Response: NO REPLY on Dec 03 20:12:19 2021 PDT
    Failure Reason: <none>
  Last Success Time: Dec 03 12:29:18 2021 PDT
  Last Failure Time: Dec 03 20:12:19 2021 PDT
Authorization Request:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Authorization Confirmation:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Authorization Return:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Trust Sync:
  Attempts: Total=5, Success=1, Fail=4  Ongoing Failure: Overall=0 Communication=0
  Last Response: OK on Nov 20 19:17:37 2021 PDT
    Failure Reason: <none>
  Last Success Time: Nov 20 19:17:37 2021 PDT
  Last Failure Time: Nov 20 19:17:02 2021 PDT
Hello Message:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>

License Certificates
====================
Production Cert: True
Not registered. No certificates installed

HA Info
==========
RP Role: Active
Chassis Role: Active
Behavior Role: Active
RMF: True
CF: True
CF State: Stateless
Message Flow Allowed: False

Reservation Info
================
License reservation: DISABLED

Overall status:
  Active: PID:C9407R,SN:FXS2119Q2U7
```

```
      Reservation status: NOT INSTALLED
      Request code: <none>
      Last return code: <none>
      Last Confirmation code: <none>
      Reservation authorization code: <none>
  Standby: PID:C9407R,SN:FXS2119Q2U7
      Reservation status: NOT INSTALLED
      Request code: <none>
      Last return code: <none>
      Last Confirmation code: <none>
      Reservation authorization code: <none>

Specified license reservations:

Purchased Licenses:
  No Purchase Information Available

Usage Report Summary:
=====================
Total: 137,  Purged: 0(0)
Total Acknowledged Received: 98,  Waiting for Ack: 34(39)
Available to Report: 4  Collecting Data: 2
Maximum Display: 137  In Storage: 59,  MIA: 0(0)
Report Module Status: Ready

Other Info
==========
Software ID: regid.2017-05.com.cisco.C9400,v1_ad928212-d182-407e-ac85-29e213602efa
Agent State: authorized
TS enable: True
Transport: Smart
  Default URL: https://smartreceiver.cisco.com/licservice/license
Locale: en_US.UTF-8
Debug flags: 0x7
Privacy Send Hostname: True
Privacy Send IP: True
Build type:: Production
sizeof(char)  : 1
sizeof(int)   : 4
sizeof(long)  : 4
sizeof(char *): 8
sizeof(time_t): 4
sizeof(size_t): 8
Endian: Big
Write Erase Occurred: False
XOS version: 0.12.0.0
Config Persist Received: True
Message Version: 1.3
connect_info.name: <empty>
connect_info.version: <empty>
connect_info.additional: <empty>
connect_info.prod: False
connect_info.capabilities: <empty>
agent.capabilities: UTILITY, DLC, AppHA, MULTITIER, EXPORT_2, OK_TRY_AGAIN, POLICY_USAGE
Check Point Interface: True
Config Management Interface: False
License Map Interface: True
HA Interface: True
Trusted Store Interface: True
Platform Data Interface: True
Crypto Version 2 Interface: False
SAPluginMgmtInterfaceMutex: True
SAPluginMgmtIPDomainName: True
SmartTransportVRFSupport: True
```

```
SmartAgentClientWaitForServer: 2000
SmartAgentCmReTrySend: True
SmartAgentClientIsUnified: True
SmartAgentCmClient: True
SmartAgentClientName: UnifiedClient
builtInEncryption: True
enableOnInit: True
routingReadyByEvent: True
systemInitByEvent: True
SmartTransportServerIdCheck: True
SmartTransportProxySupport: True
SmartAgentPolicyDisplayFormat: 0
SmartAgentReportOnUpgrade: False
SmartAgentIndividualRUMEncrypt: 2
SmartAgentMaxRumMemory: 50
SmartAgentConcurrentThreadMax: 10
SmartAgentPolicyControllerModel: False
SmartAgentPolicyModel: True
SmartAgentFederalLicense: True
SmartAgentMultiTenant: False
attr365DayEvalSyslog: True
checkPointWriteOnly: False
SmartAgentDelayCertValidation: False
enableByDefault: False
conversionAutomatic: False
conversionAllowed: False
storageEncryptDisable: False
storageLoadUnencryptedDisable: False
TSPluginDisable: False
bypassUDICheck: False
loggingAddTStamp: False
loggingAddTid: True
HighAvailabilityOverrideEvent: UnknownPlatformEvent
platformIndependentOverrideEvent: UnknownPlatformEvent
platformOverrideEvent: SmartAgentSystemDataListChanged
WaitForHaRole: False
standbyIsHot: True
chkPtType: 2
delayCommInit: False
roleByEvent: True
maxTraceLength: 150
traceAlwaysOn: True
debugFlags: 0
Event log max size: 5120 KB
Event log current size: 58 KB
P:C9407R,S:FXS2119Q2U7: P:C9407R,S:FXS2119Q2U7, state[2], Trust Data INSTALLED  TrustId:412
P:C9407R,S:FXS2119Q2U7: P:C9407R,S:FXS2119Q2U7, state[2], Trust Data INSTALLED  TrustId:412
Overall Trust: INSTALLED (2)
Clock sync-ed with NTP: True

Platform Provided Mapping Table
================================
  C9407R: Total licenses found: 198
Enforced Licenses:
  P:C9407R,S:FXS2119Q2U7:
    No PD enforced licenses
```

show license tech support for Smart Licensing Using Policy (Cisco Catalyst 9500 Series Switches)

The following is sample output from the **show license tech support** command on a Cisco Catalyst 9500 switch. Similar output is displayed on all supported Cisco Catalyst Access, Core, and Aggregation Switches.

```
Device# show license tech support
Smart Licensing Tech Support info

Smart Licensing Status
======================

Smart Licensing is ENABLED
License Reservation is ENABLED

Export Authorization Key:
  Features Authorized:
    <none>

Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: Transport Off

Miscellaneous:
  Custom Id: <empty>

Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Enforced (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)

Usage Reporting:
  Last ACK received: <none>
  Next ACK deadline: Jan 27 09:49:33 2021 PST
  Reporting push interval: 30  days State(2) InPolicy(90)
  Next ACK push check: <none>
  Next report push: Oct 29 09:51:33 2020 PST
  Last report push: <none>
  Last report file write: <none>

License Usage
=============
Handle: 1
  License: network-advantage
```

```
  Entitlement Tag:
regid.2017-03.com.cisco.advantagek9-Nyquist-C9500,1.0_f1563759-2e03-4a4c-bec5-5feec525a12c
  Description: network-advantage
  Count: 2
  Version: 1.0
  Status: IN USE(15)
  Status time: Oct 29 09:48:54 2020 PST
  Request Time: Oct 29 09:49:18 2020 PST
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: network-advantage
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
      Current Value: 2
  Soft Enforced: True

Handle: 2
  License: dna-advantage
  Entitlement Tag:
regid.2017-07.com.cisco.C9500-DNA-16X-A,1.0_ef3574d1-156b-486a-864f-9f779ff3ee49
  Description: C9500-16X DNA Advantage
  Count: 2
  Version: 1.0
  Status: IN USE(15)
  Status time: Oct 29 09:48:54 2020 PST
  Request Time: Oct 29 09:49:18 2020 PST
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage
  Feature Description: C9500-16X DNA Advantage
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
      Current Value: 2
  Soft Enforced: True

Handle: 7
  License: air-network-advantage
  Entitlement Tag:
regid.2018-06.com.cisco.DNA_NWStack,1.0_e7244e71-3ad5-4608-8bf0-d12f67c80896
  Description: air-network-advantage
  Count: 0
  Version: 1.0
  Status: IN USE(15)
  Status time: Oct 29 10:49:09 2020 PST
  Request Time: None
  Export status: NOT RESTRICTED
  Feature Name: air-network-advantage
  Feature Description: air-network-advantage
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
     Current Value: 0
  Soft Enforced: True

Handle: 8
  License: air-dna-advantage
  Entitlement Tag: regid.2017-08.com.cisco.AIR-DNA-A,1.0_b6308627-3ab0-4a11-a3d9-586911a0d790

  Description: air-dna-advantage
  Count: 0
  Version: 1.0
  Status: IN USE(15)
  Status time: Oct 29 10:49:09 2020 PST
```

```
  Request Time: None
  Export status: NOT RESTRICTED
  Feature Name: air-dna-advantage
  Feature Description: air-dna-advantage
  Measurements:
    ENTITLEMENT:
      Interval: 00:15:00
      Current Value: 0
  Soft Enforced: True

Product Information
===================
UDI: PID:C9500-16X,SN:FCW2233A5ZV

HA UDI List:
    Active:PID:C9500-16X,SN:FCW2233A5ZV
    Standby:PID:C9500-16X,SN:FCW2233A5ZY

Agent Version
=============
Smart Agent for Licensing: 5.0.5_rel/42

Upcoming Scheduled Jobs
=======================
Current time: Oct 29 11:04:46 2020 PST
Daily: Oct 30 09:48:56 2020 PST (22 hours, 44 minutes, 10 seconds remaining)
Init Flag Check: Expired Not Rescheduled
Reservation configuration mismatch between nodes in HA mode: Nov 05 09:52:25 2020 PST (6
days, 22 hours, 47 minutes, 39 seconds remaining)
Start Utility Measurements: Oct 29 11:19:09 2020 PST (14 minutes, 23 seconds remaining)
Send Utility RUM reports: Oct 30 09:53:10 2020 PST (22 hours, 48 minutes, 24 seconds
remaining)
Save unreported RUM Reports: Oct 29 12:04:19 2020 PST (59 minutes, 33 seconds remaining)
Process Utility RUM reports: Oct 30 09:49:33 2020 PST (22 hours, 44 minutes, 47 seconds
remaining)
Data Synchronization: Expired Not Rescheduled
External Event: Nov 28 09:49:33 2020 PST (29 days, 22 hours, 44 minutes, 47 seconds remaining)
Operational Model: Expired Not Rescheduled

Communication Statistics:
=========================
Communication Level Allowed: INDIRECT
Overall State: <empty>
Trust Establishment:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Trust Acknowledgement:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Usage Reporting:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Result Polling:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
```

```
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Authorization Request:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Authorization Confirmation:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Authorization Return:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Trust Sync:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Hello Message:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
    Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>

License Certificates
====================
Production Cert: True
Not registered. No certificates installed

HA Info
==========
RP Role: Active
Chassis Role: Active
Behavior Role: Active
RMF: True
CF: True
CF State: Stateless
Message Flow Allowed: False

Reservation Info
================
License reservation: ENABLED

Overall status:
  Active: PID:C9500-16X,SN:FCW2233A5ZV
       Reservation status: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
       Request code: <none>
       Last return code: <none>
       Last Confirmation code: 184ba6d6
       Reservation authorization code:
<[illegible]
 Network Advantage</displayName><tagDescription>C9500 Network
[illegible]
```

```
  Standby: PID:C9500-16X,SN:FCW2233A5ZY
      Reservation status: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
      Request code: <none>
      Last return code: <none>
      Last Confirmation code: 961d598f
      Reservation authorization code:
<redacted>
 Network Advantage</displayName><tagDescription>C9500 Network
<redacted>


Specified license reservations:
  C9500 Network Advantage (C9500 Network Advantage):
    Description: C9500 Network Advantage
    Total reserved count: 2
    Enforcement type: NOT ENFORCED
    Term information:
      Active: PID:C9500-16X,SN:FCW2233A5ZV
        Authorization type: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
        License type: PERPETUAL
          Start Date: <none>
          End Date: <none>
          Term Count: 1
          Subscription ID: <none>
      Standby: PID:C9500-16X,SN:FCW2233A5ZY
        Authorization type: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
        License type: PERPETUAL
          Start Date: <none>
          End Date: <none>
          Term Count: 1
          Subscription ID: <none>
  C9500-DNA-16X-A (C9500-16X DNA Advantage):
    Description: C9500-DNA-16X-A
    Total reserved count: 2
    Enforcement type: NOT ENFORCED
    Term information:
      Active: PID:C9500-16X,SN:FCW2233A5ZV
        Authorization type: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
        License type: PERPETUAL
          Start Date: <none>
          End Date: <none>
          Term Count: 1
          Subscription ID: <none>
      Standby: PID:C9500-16X,SN:FCW2233A5ZY
        Authorization type: SPECIFIC INSTALLED on Oct 29 09:44:06 2020 PST
        License type: PERPETUAL
          Start Date: <none>
          End Date: <none>
          Term Count: 1
          Subscription ID: <none>

Purchased Licenses:
  No Purchase Information Available


Other Info
==========
Software ID: regid.2017-05.com.cisco.C9500,v1_7435cf27-0075-4bfb-b67c-b42f3054e82a
Agent State: authorized
TS enable: True
Transport: Transport Off
Locale: en_US.UTF-8
Debug flags: 0x7
Privacy Send Hostname: True
```

```
Privacy Send IP: True
Build type:: Production
sizeof(char)  : 1
sizeof(int)   : 4
sizeof(long)  : 4
sizeof(char *): 8
sizeof(time_t): 4
sizeof(size_t): 8
Endian: Big
Write Erase Occurred: False
XOS version: 0.12.0.0
Config Persist Received: False
Message Version: 1.3
connect_info.name: <empty>
connect_info.version: <empty>
connect_info.additional: <empty>
connect_info.prod: False
connect_info.capabilities: <empty>
agent.capabilities: UTILITY, DLC, AppHA, MULTITIER, EXPORT_2, OK_TRY_AGAIN, POLICY_USAGE
Check Point Interface: True
Config Management Interface: False
License Map Interface: True
HA Interface: True
Trusted Store Interface: True
Platform Data Interface: True
Crypto Version 2 Interface: False
SAPluginMgmtInterfaceMutex: True
SAPluginMgmtIPDomainName: True
SmartAgentClientWaitForServer: 2000
SmartAgentCmReTrySend: True
SmartAgentClientIsUnified: True
SmartAgentCmClient: True
SmartAgentClientName: UnifiedClient
builtInEncryption: True
enableOnInit: True
routingReadyByEvent: True
systemInitByEvent: True
SmartTransportServerIdCheck: False
SmartTransportProxySupport: False
SmartAgentMaxRumMemory: 50
SmartAgentConcurrentThreadMax: 10
SmartAgentPolicyControllerModel: False
SmartAgentPolicyModel: True
SmartAgentFederalLicense: True
SmartAgentMultiTenant: False
attr365DayEvalSyslog: True
checkPointWriteOnly: False
SmartAgentDelayCertValidation: False
enableByDefault: False
conversionAutomatic: False
conversionAllowed: False
storageEncryptDisable: False
storageLoadUnencryptedDisable: False
TSPluginDisable: False
bypassUDICheck: False
loggingAddTStamp: False
loggingAddTid: True
HighAvailabilityOverrideEvent: UnknownPlatformEvent
platformIndependentOverrideEvent: UnknownPlatformEvent
platformOverrideEvent: SmartAgentSystemDataListChanged
WaitForHaRole: False
standbyIsHot: True
chkPtType: 2
delayCommInit: False
```

```
roleByEvent: True
maxTraceLength: 150
traceAlwaysOn: True
debugFlags: 0
Event log max size: 5120 KB
Event log current size: 109 KB
P:C9500-16X,S:FCW2233A5ZV: No Trust Data
P:C9500-16X,S:FCW2233A5ZY: No Trust Data
Overall Trust: No ID

Platform Provided Mapping Table
===============================
  C9500-16X: Total licenses found: 143
Enforced Licenses:
  P:C9500-16X,S:FCW2233A5ZV:
    No PD enforced licenses
  P:C9500-16X,S:FCW2233A5ZY:
    No PD enforced licenses
```

show license udi

To display Unique Device Identifier (UDI) information for a product instance, enter the **show license udi** command in Privileged EXEC mode. In a High Availability set-up, the output displays UDI information for all connected product instances.

show license udi

Syntax Description

This command has no arguments or keywords.

Command Default

Privileged EXEC (#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	The command continues to be available and applicable in the Smart Licensing Using Policy environment.

Usage Guidelines

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, command output displays fields pertinent to Smart Licensing.

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, command output displays fields pertinent to Smart Licensing Using Policy.

In a High Availabilty or stacking set-up, the output of the **show license udi** command displays the UDI information for all connected product instances.

Examples

show licensing udi for Smart Licensing Using Policy, on page 209

show licensing udi for Smart Licensing Using Policy

The following is sample output of the **show license udi** command for a High Availability set-up on a Catalyst 9500 switch. Similar output is displayed on all supported Cisco Catalyst Access, Core, and Aggregation Switches.

```
Device# show license udi

UDI: PID:C9500-16X,SN:FCW2233A5ZV
HA UDI List:
Active:PID:C9500-16X,SN:FCW2233A5ZV
Standby:PID:C9500-16X,SN:FCW2233A5ZY
```

show license usage

To display license usage information such as status, a count of licenses being used, and enforcement type, enter the **show license usage** command in privileged EXEC mode.

show license usage

This command has no arguments or keywords.

Command Default

Privileged EXEC (#)

Command History

Release	Modification
	This command was introduced.
Cisco IOS XE Amsterdam 17.3.2a	Command output was updated to reflect new fields that are applicable to Smart Licensing Using Policy. This includes the `Status`, `Enforcement type` fields. Command output was also updated to remove reservation related information, authorization status information, and export status information.

Usage Guidelines

Smart Licensing: If the software version on the device is Cisco IOS XE Amsterdam 17.3.1 or an earlier release, command output displays fields pertinent to Smart Licensing.

Smart Licensing Using Policy: If the software version on the device (also referred to as a product instance) is Cisco IOS XE Amsterdam 17.3.2a or a later release, command output displays fields pertinent to Smart Licensing Using Policy.

License status

- The **unenforced licenses** that are available on Cisco Catalyst Access, Core, and Aggregation Switches are never `NOT AUTHORIZED` or `NOT IN USE`.
- The **export-controlled license**, Export Control Key for High Security (HSECK9 key), which is supported on the switches listed below, displays status `NOT IN USE` if an HSECK9 key is available on the product instance and the requisite Smart Licensing Authorization Code (SLAC) is installed, but the cryptographic feature that requires the HSECK9 key is not configured.
  - Cisco Catalyst 9300X Series Switches, from Cisco IOS XE Bengaluru 17.6.2

- Cisco Catalyst 9600 Series 40-Port 50G, 2-Port 200G, 2-Port 400G Line Card (C9600-LC-40YL4CD) from Cisco IOS XE Cupertino 17.8.1
- Cisco Catalyst 9500X Series Switches from Cisco IOS XE Cupertino 17.8.1

Configure the applicable cryptographic feature for the count and status fields to change to 1 and IN USE respectively.

Usage Count

In a stacking setup, even if you install SLAC on more than one device, the usage count remains 1. This is because only one HSECK9 key is used at a given point in time - the one on the active. The license on the standby comes into effect when a switchover occurs. The count remains 1 with the new active as well, because it is still only one HSECK9 key that is being used.

In case of a modular chassis, the usage count must display only 1 because only one HSECK9 key is required for each chassis UDI - regardless of the number of supervisors installed.

Examples

See Table 20: show license usage Field Descriptions for Smart Licensing Using Policy, on page 210 for information about fields shown in the display.

show license usage for Smart Licensing Using Policy, on page 211

Table 20: show license usage Field Descriptions for Smart Licensing Using Policy

Field	Description
License Authorization: Status:	Displays overall authorization status.
():	Name of the license as in CSSM. If this license is one that requires an authorization code, the name of the li the code.
Description	Description of the license as in CSSM.
Count	License count. If the license is not in-use, the count is reflected as zero.
Version	Version.
Status	License status can be one of the following • In-Use: Valid license, and in-use. • Not In-Use: An HSECK9 key is available on the product instance a Smart Licensing Authorization Code (SLAC) is installed, but the cry that requires the HSECK9 key is disabled or not configured. This status is a prerequisite when you want to *return* the SLAC for to CSSM. • Not Authorized: The license requires installation of a SLAC before

Field	Description
Export Status:	Indicates if the license is export-controlled or not. Accordingly, one of is displayed: • RESTRICTED - ALLOWED • RESTRICTED - NOT ALLOWED • NOT RESTRICTED
Feature name	Name of the feature that uses this license.
Feature Description:	Description of the feature that uses this license.
Utility Subscription id:	ID Not applicable, because the corresponding confiuration option is not
Enforcement type	Enforcement type status for the license. This may be one of the follo • ENFORCED: A license, which requires authorization before us • NOT ENFORCED: A license, which does not require authoriza • EXPORT RESTRICTED - ALLOWED: An export-controlled lic authorization, that is, a SLAC is installed. • EXPORT RESTRICTED - NOT ALLOWED: An export-contro the required authorization. An export-controlled license requires use.

show license usage for Smart Licensing Using Policy

The following is sample output of the **show license usage** command on a Cisco Catalyst 9500 switch. Unenforced licenses are in-use here. Similar output is displayed on all supported Cisco Catalyst Access, Core, and Aggregation Switches.

```
Device# show license usage
License Authorization:
  Status: Not Applicable
network-advantage (C9500 Network Advantage):
  Description: network-advantage
  Count: 2
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: network-advantage
  Feature Description: network-advantage
  Enforcement type: NOT ENFORCED
  License type: Perpetual
dna-advantage (C9500-16X DNA Advantage):
  Description: C9500-16X DNA Advantage
  Count: 2
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage
  Feature Description: C9500-16X DNA Advantage
```

```
Enforcement type: NOT ENFORCED
License type: Subscription
```

Related Commands

Command	Description
show license all	Displays entitlements information.
show license status	Displays compliance status of a license.
show license summary	Displays summary of all active licenses.
show license udi	Displays UDI.
show tech-support license	Displays the debug output.

show platform software sl-infra

To display troubleshooting information and for debugging, enter the **show platform software sl-infra** command in privileged EXEC mode. The output of this command is used by the technical support team, for troubleshooting and debugging.

show platform software sl-infra { **all** | **current** | **debug** | **stored** }

Syntax Description

all	Displays current, debugging, and stored information.
current	Displays current license-related information.
debug	Enables debugging
stored	Displays information that is stored on the product instance.

Command Modes

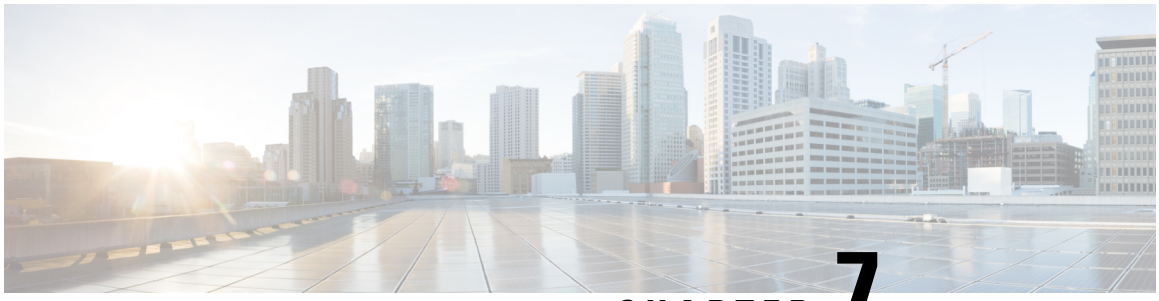
Privileged EXEC (Device#)

Command History

Release	Modification
Cisco IOS XE Amsterdam 17.3.2a	This command was introduced.

Usage Guidelines

When you encounter an error message that you are not able to resolve, along with a copy of the message that appears on the console or in the system log, provide your Cisco technical support representative with sample output of these commands: **show license tech support**, **show license history message**, and the **show platform software sl-infra all** privileged EXEC commands.



CHAPTER 7

Troubleshooting Smart Licensing Using Policy

This section provides the list of Smart Licensing Using Policy-related system messages you may encounter, possible reasons for failure, and recommended action.

System Message Overview

The system software sends system messages to the console (and, optionally, to a logging server on another system). Not all system messages mean problems with your system. Some messages are informational, and others can help diagnose problems with communications lines, internal hardware, or the system software.

How to Read System Messages

System log messages can contain up to 80 characters. Each system message begins with a percent sign (%) and is structured as follows:

```
%FACILITY-SEVERITY-MNEMONIC: Message-text
```

%FACILITY

Two or more uppercase letters that show the facility to which the message refers. A facility can be a hardware device, a protocol, or a module of the system software

SEVERITY

A single-digit code from 0 to 7 that reflects the severity of the condition. The lower the number, the more serious the situation.

Table 21: Message Severity Levels

Severity Level	Description
0 - emergency	System is unusable.
1 - alert	Immediate action required.
2 - critical	Critical condition.

Severity Level	Description
3 - error	Error condition.
4 - warning	Warning condition.
5 - notification	Normal but significant condition.
6 - informational	Informational message only.
7 - debugging	Message that appears during debugging only.

MNEMONIC

A code that uniquely identifies the message.

Message-text

Message-text is a text string describing the condition. This portion of the message sometimes contains detailed information about the event, including terminal port numbers, network addresses, or addresses that correspond to locations in the system memory address space. Because the information in these variable fields changes from message to message, it is represented here by short strings enclosed in square brackets ([ ]). A decimal number, for example, is represented as [dec].

Table 22: Variable Fields in Messages

Severity Level	Description
[char]	Single character
[chars]	Character string
[dec]	Decimal number
[enet]	Ethernet address (for example, 0000.FEED.00C0)
[hex]	Hexadecimal number
[inet]	Internet address (for example, 10.0.2.16)
[int]	Integer
[node]	Address or node name
[t-line]	Terminal line number in octal (or in decimal if the decimal-TTY service is enabled)
[clock]	Clock (for example, 01:20:08 UTC Tue Mar 2 1993

System Messages

This section provides the list of Smart Licensing Using Policy-related system messages you may encounter, possible reasons for failure (incase it is a failure message), and recommended action (if action is required).

For all error messages, if you are not able to solve the problem, contact your Cisco technical support representative with the following information:

- The message, exactly as it appears on the console or in the system log.
- The output from the **show license tech support**, **show license history message**, and the **show platform software sl-infra** privileged EXEC commands.

Smart Licensing Using Policy-related system messages:

- %SMART_LIC-3-POLICY_INSTALL_FAILED
- %SMART_LIC-3-AUTHORIZATION_INSTALL_FAILED
- %SMART_LIC-3-COMM_FAILED
- %SMART_LIC-3-COMM_RESTORED
- %SMART_LIC-3-POLICY_REMOVED
- %SMART_LIC-3-TRUST_CODE_INSTALL_FAILED
- %SMART_LIC-4-REPORTING_NOT_SUPPORTED
- %SMART_LIC-6-POLICY_INSTALL_SUCCESS
- %SMART_LIC-6-AUTHORIZATION_INSTALL_SUCCESS
- %SMART_LIC-6-AUTHORIZATION_REMOVED
- %SMART_LIC-6-REPORTING_REQUIRED
- %SMART_LIC-6-TRUST_CODE_INSTALL_SUCCESS

```
Error Message %SMART_LIC-3-POLICY_INSTALL_FAILED: The installation of a new
licensing policy has failed: [chars].
```

Explanation: A policy was installed, but an error was detected while parsing the policy code, and installation failed. [chars] is the error string with details of the failure.

Possible reasons for failure include:

- A signature mismatch: This means that the system clock is not accurate.
- A timestamp mismatch: This means the system clock on the product instance is not synchronized with CSSM.

Recommended Action:

For both possible failure reasons, ensure that the system clock is accurate and synchronized with CSSM. Configure the **ntp server** command in global configuration mode. For example:

```
Device(config)# ntp server 198.51.100.100 version 2 prefer
```

If the above does not work and policy installation still fails, contact your Cisco technical support representative.

```
Error Message %SMART_LIC-3-AUTHORIZATION_INSTALL_FAILED: The install of a new
licensing authorization code has failed on [chars]: [chars].
```

Explanation: Authorization code installation was attempted, but installation failed. The first [chars] is the UDI for which the authorization code installation failed, and the second [chars] is the error string with details of the failure.

Possible reasons for failure include:

- Not enough licenses with authorization for currently configured features: This means that you have not provided the requisite number of authorization codes.
- UDI mismatch: One or more UDIs in the authorization code file do not match with the product instance where you are installing the authorization code file. If you have generated authorization codes for multiple UDIs, for a High Availability or stacking set-up, all the UDIs listed in the authorization code file must match with all the UDIs in the High Availability or stacking set-up. If this is not the case, installation fails.

  Cross-check all UDIs in the authorizatin code file against the UDIs of the product instance (standalone or High Availability).

```
Excerpt of UDI information in a SLAC file:
<smartLicenseAuthorization>
<udi>P:C9300X-24HX,SN:FOC2519L8R7</udi>

<output truncated>
</smartLicenseAuthorization>

Sample output of UDI information on a product instance:
Device# show license udi
UDI: PID:C9300X-24HX,SN:FOC2519L8R7
```

- A signature mismatch: This means that the system clock is not accurate. If the clock is not synchronized, your *attempts* at requesting SLAC are not reflected in the **show license tech** output.

```
Authorization Confirmation:
  Attempts: Total=0, Success=0, Fail=0  Ongoing Failure: Overall=0 Communication=0
```

Recommended Action

- In the output of the **show license tech support** command, check the `Failure Reason:` field to understand what may have gone wrong.

```
Device# show license tech support
<output truncated>

Communication Statistics:
=========================
Authorization Confirmation:
  Attempts: Total=2, Success=2, Fail=0  Ongoing Failure: Overall=0 Communication=0
  Last Response: OK on Sep 23 17:51:52 2020 UTC
    Failure Reason: <none>
  Last Success Time: Sep 23 17:51:52 2020 UTC
  Last Failure Time: <none>
```

- Not enough licenses in authorization for currently configured features and UDI mismatch:
- Use the **show license udi** command to verify that you have the correct and complete list of UDIs. This command displays all product instances in case of High Availability and stacking set-up. Then install SLAC again.
- Signature mismatch: Ensure that the system clock is accurate and synchronized with CSSM. To do this, configure the **ntp server** command in global configuration mode. For example:

```
Device(config)# ntp server 198.51.100.100 version 2 prefer
```

After you complete this configuration, again use the **show license tech** to verify if the clock has actually synchronized. If successfully synchronized, the `Clock sync-ed with NTP` field is set to `True`. If not synchronized, this field is set to `False`.


```
Error Message %SMART_LIC-3-COMM_FAILED: Communications failure with the [chars] :
[chars]
```

Explanation: Smart Licensing communication either with CSSM, CSLU, or SSM On-Prem failed. The first [chars] is the currently configured transport type, and the second [chars] is the error string with details of the failure. This message appears for every communication attempt that fails.

Possible reasons for failure include:

- CSSM, CSLU, SSM On-Prem is not reachable: This means that there is a network reachability problem.
- 404 host not found: This means the CSSM server is down.
- A TLS or SSL handshake failure caused by a missing client certificate. The certificate is required for TLS authentication of the two communicating sides. A recent server upgrade may have cause the certificate to be removed. This reason applies only to a topology where the product instance is directly connected to CSSM.

Note If the error message is displayed for this reason, there is no actual configuration error or disruption in the communication with CSSM.

For topologies where the product instance initiates the sending of RUM reports (Connected to CSSM Through CSLU: Product Instance-Initiated Communication, Connected Directly to CSSM, CSLU Disconnected from CSSM: Product Instance-Initiated Communication, and SSM On-Prem Deployment: Product Instance-Initiated Communication) if this communication failure message coincides with scheduled reporting (**license smart usage interval** *interval_in_days* global configuration command), the product instance attempts to send out the RUM report for up to four hours after the scheduled time has expired. If it is still unable to send out the report (because the communication failure persists), the system resets the interval to 15 minutes. Once the communication failure is resolved, the system reverts the reporting interval to last configured value.

Recommended Action:

Troubleshooting steps are provided for when CSSM is not reachable or there is a missing client certificate, when CSLU is not reachable, and when SSM On-Prem is not reachable.

- If a client certificate is missing and there is no actual configuration error or disruption in the communication with CSSM:

  To resolve the error, configure the **ip http client secure-trustpoint** *trustpoint-name* command in global configuration mode. For *trustpoint-name*, enter only `SLA-TrustPoint`. This command specifies that the secure HTTP client should use the certificate associated with the trustpoint indicated by the trustpoint-name argument.

- If CSSM is not reachable and the configured transport type is **smart**:

  1. Check if the smart URL is configured correctly. Use the **show license status** command in privileged EXEC mode, to check if the URL is exactly as follows: https://smartreceiver.cisco.com/licservice/

license. If it is not, reconfigure the **license smart url smart** *smar_URL* command in global configuration mode.

2. Check DNS resolution. Verify that the product instance can ping `smartreceiver.cisco.com` or the nslookup translated IP. The following example shows how to ping the translated IP

```
Device# ping 171.70.168.183
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 171.70.168.183, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms
```

- If CSSM is not reachable and the configured transport type is **callhome**:

1. Check if the URL is entered correctly. Use the **show license status** command in privileged EXEC mode, to check if the URL is exactly as follows: https://tools.cisco.com/its/service/oddce/services/DDCEService.

2. Check if Call Home profile `CiscoTAC-1` is active and destination URL is correct. Use the **show call-home profile all** command in privileged EXEC mode:

```
Current smart-licensing transport settings:
 Smart-license messages: enabled
 Profile: CiscoTAC-1 (status: ACTIVE)
 Destination  URL(s):  https://tools.cisco.com/its/service/oddce/services/DDCEService
```

3. Check DNS Resolution. Verify that the product instance can ping `tools.cisco.com`, or the nslookup translated IP.

```
Device# ping tools.cisco.com
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 173.37.145.8, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 41/41/42 ms
```

   If the above does not work check the following: if the product instance is set, if the product instance IP network is up. To ensure that the network is up, configure the **no shutdown** command in interface configuration mode.

   Check if the device is subnet masked with a subnet IP, and if the DNS IP is confgured.

4. Verify that the HTTPs client source interface is correct.

   Use the **show ip http client** command in privileged EXEC mode to display current configuration. Use **ip http client source-interface** command in global configuration mode to reconfigure it.

   In case the above does not work, double-check your routing rules, and firewall settings.

- If CSLU is not reachable:

1. Check if CSLU discovery works.

   - Zero-touch DNS discovery of `cslu-local` or DNS discovery of your domain..

     In the **show license all** command output, check if the `Last ACK received:` field. If this has a recent timestamp it means that the product instance has connectivity with CSLU. If it is not, proceed with the following checks:

     Check if the product instance is able to ping `cslu-local`. A successful ping confirms that the product instance is reachable.

If the above does not work, configure the name server with an entry where hostname `cslu-local` is mapped to the CSLU IP address (the windows host where you installed CSLU). Configure the **ip domain name** *domain-name* and **ip name-server** *server-address* commands in global configuration mode. Here the CSLU IP is 192.168.0.1 and name-server creates entry `cslu-local.example.com`:

```
Device(config)# ip domain name example.com
Device(config)# ip name-server 192.168.0.1
```

- CSLU URL is configured.

  In the **show license all** command output, under the `Transport:` header check the following: The `Type:` must be `cslu`and `Cslu address:` must have the hostname or the IP address of the windows host where you have installed CSLU. Check if the rest of the address is configured as shown below and check if the port number is 8182.

  ```
  Transport:
    Type: cslu
    Cslu address: http://192.168.0.1:8182/cslu/v1/pi
  ```

  If it is not, configure the **license smart transport cslu** and **license smart url cslu** *http://<cslu_ip_or_host>:8182/cslu/v1/pi* commands in global configuration mode

2. For CSLU-initiated communication, in addition to the CSLU discovery checks listed above, check the following:

   Verify HTTP connectivity. Use the **show ip http server session-module** command in privileged EXEC mode. In the output, under header `HTTP server current connections:`, check that `SL_HTTP` is active. If it is not re-configure the **ip http** commands as mentioned in Ensuring Network Reachability for CSLU-Initiated Communication, on page 81.

   From a Web browser on the device where CSLU is installed, verify `https://<product-instance-ip>/`. This ensures that the REST API from CSLU to the product instance works as expected.

- If SSM On-Prem is not reachable:

1. For product instance-initiated communication, check if the SSM On-Prem transport type and URL are configured correctly.

   In the **show license all** command output, under the `Transport:` header check the following: The `Type:` must be `cslu`and `Cslu address:` must have the hostname or the IP address of the server where you have installed SSM On-Prem and <tenantID> of the *default* local virtual account. See the example below:

   ```
   Transport:
     Type: cslu
     Cslu address: https://192.168.0.1/cslu/v1/pi/on-prem-default
   ```

   Check if you have the correct URL from SSM On-Prem (See Retrieving the Transport URL (SSM On-Prem UI), on page 98) and then configure **license smart transport cslu** and **license smart url cslu** *http://<ip>/cslu/v1/pi/<tenant ID>* commands in global configuration mode.

   Check that you have configured any other required commands for your network, as mentioned in Ensuring Network Reachability for Product Instance-Initiated Communication, on page 96

2. For SSM On-Prem-initiated communication, check HTTPs connectivity.

Use the **show ip http server session-module** command in privileged EXEC mode. In the output, under header `HTTP server current connections:`, check that `SL_HTTP` is active. If it is not re-configure the **ip http** commands as mentioned in Ensuring Network Reachability for SSM On-Prem-Initiated Communication, on page 101.

3. Check trustpoint and that certificates are accepted.

   For both forms of communication in an SSM On-Prem Deployment, ensure that the correct trustpoint is used and that the necessary certificates are accepted:

```
Device(config)# crypto pki trustpoint SLA-TrustPoint
Device(ca-trustpoint)#
Device(ca-trustpoint)# enrollment terminal
Device(ca-trustpoint)# revocation-check none
Device(ca-trustpoint)# end
Device# copy running-config startup-config
```

If the above does not work and the communication failure persists, contact your Cisco technical support representative.

```
Error Message  %SMART_LIC-3-COMM_RESTORED: Communications with the [chars] restored.
[chars] - depends on the transport type
        - Cisco Smart Software Manager (CSSM)
        - Cisco Smart License utility (CSLU)
Smart Agent communication with either the Cisco Smart Software Manager (CSSM) or the Cisco
 Smart License
utility (CSLU) has been restored. No action required.
```

Explanation: Product instance communication with either the CSSM, CSLU, or SSM On-Prem is restored.

Recommended Action: No action required.

```
Error Message %SMART_LIC-3-POLICY_REMOVED: The licensing policy has been removed.
```

Explanation: A previously installed *custom* licensing policy has been removed. The `Cisco default` policy is then automatically effective. This may cause a change in the behavior of smart licensing.

Possible reasons for failure include:

If you have entered the **license smart factory reset** command in privileged EXEC mode all licensing information including the policy is removed.

Recommended Action:

If the policy was removed intentionally, then no further action is required.

If the policy was removed inadvertantly, you can reapply the policy. Depending on the topology you have implemented, follow the corresponding method to retrieve the policy:

- Connected Directly to CSSM:

Enter **show license status**, and check field `Trust Code Installed:`. If trust is established, then CSSM will automatically return the policy again. The policy is automatically re-installed on product instances of the corresponding Virtual Account.

If trust has not been established, complete these tasks: Generating a New Token for a Trust Code from CSSM, on page 121 and Establishing Trust with an ID Token, on page 122. When you have completed these tasks, CSSM will automatically return the policy again. The policy is then automatically installed on all product instances of that Virtual Account.

- Connected to CSSM Through CSLU:
  - For product instance-initiatied communication), enter the **license smart sync** command in privileged EXEC mode. The synchronization request causes CSLU to push the missing information (a policy or authurization code) to the product instance.
  - For CSLU-initiated communication, complete this task: Collecting Usage Reports: CSLU Initiated (CSLU Interface), on page 79. This causes CSLU to detect and re-furnish the missing policy in an ACK response.
- CSLU Disconnected from CSSM:
  - For product instance-initiatied communication), enter the **license smart sync** command in privileged EXEC mode. The synchronization request causes CSLU to push the missing information (a policy or authurization code) to the product instance. Then complete these tasks in the given order: Export to Cisco SSM (CSLU Interface), on page 80 > Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124 > Import from Cisco SSM (CSLU Interface), on page 81.
  - For CSLU-initiated communication, complete this task: Collecting Usage Reports: CSLU Initiated (CSLU Interface), on page 79. This causes CSLU to detect and re-furnish the missing policy in an ACK response. Then complete these tasks in the given order: Export to Cisco SSM (CSLU Interface), on page 80 > Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124 > Import from Cisco SSM (CSLU Interface), on page 81.
- No Connectivity to CSSM and No CSLU

  If you are in an entirely air-gapped network, from a workstation that has connectivity to the internet and CSSM complete these tasks: Downloading a Policy File from Cisco SSM, on page 123 and Installing a File on the Product Instance, on page 125.
- SSM On-Prem Deployment
  - For product instance-initiatied communication), enter the **license smart sync** command in privileged EXEC mode. The causes the product instance to synchronize with SSM On-Prem and restore any required or missing information. Then synchronize SSM On-Prem with CSSM if required:
  - For SSM On-Prem-initiated communication: In the SSM On-Prem UI, navigate to **Reports** > **Synchronisation pull schedule with the devices** > **Synchronise now with the device**.

  For both forms of communication in an SSM On-Prem Deployment, synchronize with CSSM using either option:
  - SSM On-Prem is connected to CSSM: In the SSM On-Prem UI, Smart Licensing workspace, nagivate to **Reports** > **Usage Schedules** > **Synchronize now with Cisco**.
  - SSM On-Prem is not connected to CSSM: See Exporting and Importing Usage Data (SSM On-Prem UI), on page 99.

```
Error Message %SMART_LIC-3-TRUST_CODE_INSTALL_FAILED: The install of a new licensing
trust code has failed on [chars]: [chars].
```

Explanation: Trust code installation has failed. The first [chars] is the UDI where trust code installation was attempted. The second [chars] is the error string with details of the failure.

Possible reasons for failure include:

- A trust code is already installed: Trust codes are node-locked to the UDI of the product instance. If the UDI is already registered, and you try to install another one, installation fails.
- Smart Account-Virtual Account mismatch: This means the Smart Account or Virtual Account (for which the token ID was generated) does not include the product instance on which you installed the trust code. The token generated in CSSM, applies at the Smart Account or Virtual Account level and applies only to all product instances in that account.
- A signature mismatch: This means that the system clock is not accurate.
- Timestamp mismatch: This means the product instance time is not synchronized with CSSM, and can cause installation to fail.

Recommended Action:

- A trust code is already installed: If you want to install a trust code inspite of an existing trust code on the product instance, re-configure the **license smart trust idtoken** *id_token_value* {**local** | **all**} [**force**] command in privileged EXEC mode, and be sure to include the **force** keyword this time. Entering the **force** keyword sets a force flag in the message sent to CSSM to create a new trust code even if one already exists.
- Smart Account-Virtual Account mismatch:

  Log in to the CSSM Web UI at https://software.cisco.com. Under **Smart Software Licensing**, click the **Manage licenses**link. Click the **Inventory** tab. From the **Virtual Account** drop-down list, choose the required virtual account. Click the **Product Instances** tab.

  Check if the product instance on which you want to generate the token is listed in the selected Virtual Account. If it is, proceed to the next step: Generating a New Token for a Trust Code from CSSM, on page 121 and Establishing Trust with an ID Token, on page 122. If not, check and select the correct Smart Account and Virtual Account. Then complete the next steps.
- Timestamp mismatch and signature mismatch: Configure the **ntp server** command in global configuration mode. For example:

  ```
  Device(config)# ntp server 198.51.100.100 version 2 prefer
  ```

```
Error Message    %SMART_LIC-4-REPORTING_NOT_SUPPORTED: The CSSM OnPrem that this
product instance is connected to is down rev and does not support the enhanced policy and
usage
reporting mode.
```

Explanation: Cisco Smart Software Manager On-Prem (formerly known as Cisco Smart Software Manager satellite) is supported in the Smart Licensing Using Policy environment starting with Cisco IOS XE Amsterdam 17.3.3 only (See SSM On-Prem Deployment, on page 20). In *unsupported* releases, the product instance will behave as follows:

- Stop sending registration renewals and authorization renewals.
- Start recording usage and saving RUM reports locally.

Recommended Action:

You have the following options:

- Refer to and implement one of the supported topologies instead. See: Connecting to Cisco SSM, on page 12.
- Upgrade to a release where SSM On-Prem is supported with Smart Licensing Using Policy. <<**Migrating to a Version of SSM On-Prem That Supports Smart Licensing Using Policy**>>

```
Error Message %SMART_LIC-6-POLICY_INSTALL_SUCCESS: A new licensing policy
was successfully installed.
```

Explanation: A policy was installed in one of the following ways:

- Using Cisco IOS commands.
- CSLU-initiated communication.
- As part of an ACK response.

Recommended Action: No action is required. If you want to know which policy is applied (the policy in-use) and its reporting requirements, enter the **show license all** command in privileged EXEC mode.

```
Error Message %SMART_LIC-6-AUTHORIZATION_INSTALL_SUCCESS: A new licensing
authorization code was successfully installed on: [chars].
```

Explanation: [chars] is the UDI where the authorization code was installed successfully.

Recommended Action: No action is required. If you want to know the details of the authorization code that was installed, enter the **show license authorization** command in privileged EXEC mode.

```
Error Message %SMART_LIC-6-AUTHORIZATION_REMOVED: A licensing authorization code has
 been removed from [chars]
```

Explanation: [chars] is the UDI where the authorization code was installed. The authorization code has been removed. This removes the licenses from the product instance and may cause a change in the behavior of smart licensing and the features using licenses.

Recommended Action: No action is required. If you want to see the current state of the license, enter the **show license all** command in privileged EXEC mode.


```
Error Message %SMART_LIC-6-REPORTING_REQUIRED: A Usage report acknowledgement
will be required in [dec] days.
```

Explanation: This is an alert which means that RUM reporting to Cisco is required. [dec] is the amount of time (in days) left to meet this reporting requirements.

Recommended Action: Ensure that RUM reports are sent within the requested time. The topology you have implemented determines the reporting method.

- Connected to CSSM Through CSLU
  - For product instance-initiatied communication: Enter the **license smart sync** command in privileged EXEC mode. If CSLU is currently logged into CSSM the reports will be automatically sent to the associated Smart Account and Virtual Account in CSSM.
  - For CSLU-initiated communication, complete this task: Collecting Usage Reports: CSLU Initiated (CSLU Interface), on page 79.
- Connected Directly to CSSM: Enter the **license smart sync** command in privileged EXEC mode.
- Connected to CSSM Through a Controller: If the product instance is managed by a controller, the controller will send the RUM report at the scheduled time.

  If you are using Cisco DNA Center as the controller, you have the option of ad-hoc reporting. See the *Cisco DNA Center Administrator Guide* of the required release (Release 2.2.2 onwards) > *Manage Licenses* > *Upload Resource Utilization Details to CSSM*.
- CSLU Disconnected from CSSM: If the product instance is connected to CSLU, synchronize with the product instance as shown for "Connected to CSSM Through CSLU"above, then complete these tasks: Export to Cisco SSM (CSLU Interface), on page 80 > Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124 > Import from Cisco SSM (CSLU Interface), on page 81.
- No Connectivity to CSSM and No CSLU: Enter the **license smart save usage** command in privileged EXEC mode, to save the required usage information in a file. Then, from a workstation where you have connectivity to CSSM, complete these tasks: Uploading Data or Requests to Cisco SSM and Downloading a File, on page 124 > Installing a File on the Product Instance, on page 125.
- SSM On-Prem Deployment:

  Synchronize the product instance with SSM On-Prem:
  - For product instance-initiatied communication: Enter the **license smart sync** command in privileged EXEC mode. If CSLU is currently logged into CSSM the reports will be automatically sent to the associated Smart Account and Virtual Account in CSSM.
  - For SSM On-Prem-initiated communication, complete this task: In the SSM On-Prem UI, navigate to **Reports** > **Synchronisation pull schedule with the devices** > **Synchronise now with the device**.

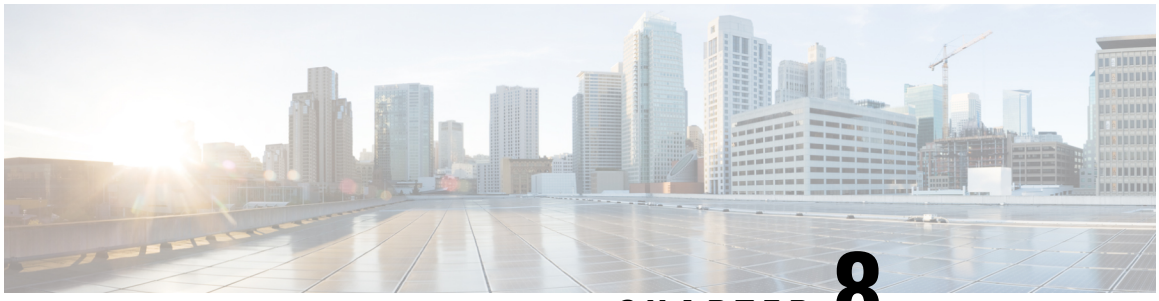
  Synchronize usage information with CSSM (*choose one*)
  - SSM On-Prem is connected to CSSM: In the SSM On-Prem UI, Smart Licensing workspace, nagivate to **Reports** > **Usage Schedules** > **Synchronize now with Cisco**.

- SSM On-Prem is not connected to CSSM: See Exporting and Importing Usage Data (SSM On-Prem UI), on page 99.

```
Error Message %SMART_LIC-6-TRUST_CODE_INSTALL_SUCCESS: A new licensing trust code
 was successfully installed on [chars].
```

Explanation:[chars] is the UDI where the trust code was successfully installed.

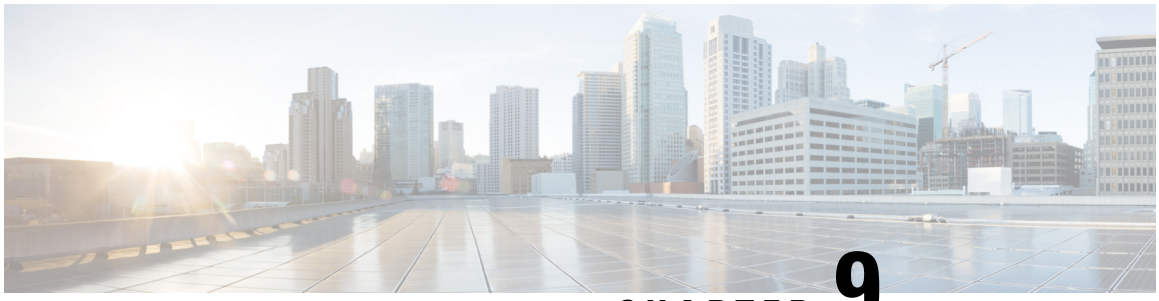
Recommended Action: No action is required. If you want to verify that the trust code is installed, enter the **show license status** command in privileged EXEC mode. Look for the updated timestamp under header `Trust Code Installed:` in the output.



CHAPTER 8

Additional References for Smart Licensing Using Policy

Topic	Document Title
For complete syntax and usage information for the commands used in this chapter, see *System Mangement* > *System Mangement Commands* in the Command Reference of the required release.	
Cisco Smart Software Manager Help	Smart Software Manager Help
Cisco Smart License Utility (CSLU) installation and user guides	Cisco Smart Licensing Utility Quick Start Setup Guide Cisco Smart Licensing Utility User Guide
General information about Smart Licensing	Smart Software Licensing
Troubleshooting TechNotes	Smart Licensing using Policy on Catalyst Switching Platforms Migrate Catalyst License to Smart Licensing Using Policy
Cisco DNA for Switching	Cisco DNA Software Subscription Matrix for Switching



CHAPTER 9

Feature History for Smart Licensing Using Policy

This table provides release and related information for features explained in this module.

These features are available on all releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Fuji 16.9.1	Smart Licensing	A cloud-based, software license management solution that allows you to manage and track the status of your license, hardware, and software usage trends. Starting from this release, Smart Licensing is the default and the only available method to manage licenses. Starting from Cisco IOS XE Fuji 16.9.1, the Right-To-Use (RTU) licensing mode is deprecated, and the associated **license right-to-use** command is no longer available on the CLI. This feature was introduced on: • Cisco Catalyst 9300 Series Switches • Cisco Catalyst 9400 Series Switches • Cisco Catalyst 9500 Series Switches

Release	Feature	Feature Information
Cisco IOS XE Fuji 16.9.2	Smart Licensing	A cloud-based, software license management solution that allows you to manage and track the status of your license, hardware, and software usage trends. Starting from this release, Smart Licensing is the default and the only available method to manage licenses. Starting from Cisco IOS XE Fuji 16.9.1, the Right-To-Use (RTU) licensing mode is deprecated, and the associated **license right-to-use** command is no longer available on the CLI. This feature was introduced on Cisco Catalyst 9200 Series Switches.
Cisco IOS XE Gibraltar 16.11.1	Smart Licensing	A cloud-based, software license management solution that allows you to manage and track the status of your license, hardware, and software usage trends. Smart Licensing is the default and the only available method to manage licenses. This feature was introduced on Cisco Catalyst 9600 Series Switches.

Release	Feature	Feature Information
Cisco IOS XE Amsterdam 17.3.2a	Smart Licensing Using Policy	An enhanced version of Smart Licensing, with the overarching objective of providing a licensing solution that does not interrupt the operations of your network, rather, one that enables a compliance relationship to account for the hardware and software licenses you purchase and use. Starting with this release, Smart Licensing Using Policy is automatically enabled on the device. This is also the case when you upgrade to this release. By default, your Smart Account and Virtual Account in CSSM is enabled for Smart Licensing Using Policy.
	Cisco DNA Center support for Smart Licensing Using Policy	Cisco DNA Center supports Smart Licensing Using Policy functionality starting with Cisco DNA Center Release 2.2.2. When you use Cisco DNA Center to manage a product instance, Cisco DNA Center connects to CSSM, and is the interface for all communication to and from CSSM. For information about the comptabile controller and product instance versions, see Components Involved. For information about this topology, see Workflow for Topology: Connected to Cisco SSM Through a Controller, on page 32.
Cisco IOS XE Amsterdam 17.3.3	Smart Software Manager On-Prem (SSM On-Prem) Support for Smart Licensing Using Policy	SSM On-Prem is an asset manager, which works in conjunction with CSSM. It enables you to administer products and licenses on your premises instead of having to directly connect to CSSM. For information about the comptabile SSM On-Prem and product instance versions, see: SSM On-Prem Deployment, on page 20. For an overview of this topology, see Workflow for Topology: SSM On-Prem Deployment, on page 39. For information about migrating from an exisiting version of SSM On-Prem, to one that supports Smart Licensing Using Policy, see Migrating to a Version of SSM On-Prem That Supports Smart Licensing Using Policy, on page 73.

Release	Feature	Feature Information
Cisco IOS XE Bengaluru 17.6.2	Export Control Key for High Security (HSECK9 key)	The HSECK9 key was introduced on the Cisco Catalyst 9300X Series Switches. The HSECK9 key is an export-controlled license, which authorizes the use of cryptographic features that are restricted by U.S. export control laws. If you want to use a restricted cryptographic feature, an HSECK9 key is required. See Authorization Code, on page 3. On product instances where the HSECK9 key is supported, you can obtain and install SLAC by implementing one of these topologies: • Workflow for Topology: Connected to Cisco SSM Through CSLU, on page 27 • Workflow for Topology: Connected Directly to Cisco SSM, on page 31 • Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33 • Workflow for Topology: No Connectivity to Cisco SSM and No CSLU, on page 37 • Workflow for Topology: SSM On-Prem Deployment, on page 39

Release	Feature	Feature Information
Cisco IOS XE Cupertino 17.7.1	CSLU support for Linux	Support for CSLU deployment on a machine (laptop or desktop) running Linux. See Components Involved, Workflow for Topology: Connected to Cisco SSM Through CSLU, on page 27, and Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33.
	Factory-installed trust code	For new hardware orders, Cisco installs a trust code at the time of manufacturing. For more information, see Trust Code, on page 6.
	Trust code request and installation in additional topologies	A trust code is automatically obtained in topologies where the product instance initiates the sending of data to *CSLU* and in topologies where the product instance is in an air-gapped network. See: • Trust Code, on page 6 • Workflow for Topology: Connected to Cisco SSM Through CSLU, on page 27 and Tasks for Product Instance-Initiated Communication, on page 33 • Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33 and Tasks for Product Instance-Initiated Communication, on page 33 • Workflow for Topology: No Connectivity to Cisco SSM and No CSLU, on page 37 and Workflow for Topology: No Connectivity to Cisco SSM and No CSLU, on page 37 • In the command reference of the corresponding release, see the **license smart** privileged EXEC command.
	Ability to save SLAC request and return in a file in an air-gapped network	

Release	Feature	Feature Information
		Option to save a SLAC request file on the product instance. The SLAC request file must be uploaded to CSSM and the file containing the SLAC code can then be downloaded and installed it on the product instance - the same as a RUM report and ACK. With this method you do not have to gather and enter the required details on the CSSM Web UI to generate a SLAC Similarly, an authorization code that is saved to a file can also be uploaded the same way as a RUM report. In the command reference of the corresponding release, see the **license smart** privileged EXEC command. See Workflow for Topology: No Connectivity to Cisco SSM and No CSLU, on page 37 and Workflow for Topology: No Connectivity to Cisco SSM and No CSLU, on page 37.
	Support to collect software version in a RUM report	If version privacy is disabled (**no license smart privacy version** global configuration command), the Cisco IOS-XE software version running on the product instance and the Smart Agent version information is *included* in the RUM report. In the command reference of the corresponding release, see the **license smart** global configuration command.
	RUM Report optimization and availability of statistics	RUM report generation and related processes have been optimized. This includes a reduction in the time it takes to process RUM reports, better memory and disk space utilization, and visibility into the RUM reports on the product instance (how many there are, the processing state each one is in, if there are errors in any of them, and so on). See RUM Report and Report Acknowledgement, on page 5, Upgrades Within the Smart Licensing Using Policy Environment, on page 49, and Downgrades Within the Smart Licensing Using Policy Environment, on page 50. In the command reference of the corresponding release, see the **show license rum**, **show license all**, and **show license tech** privileged EXEC commands.

Release	Feature	Feature Information
	Account information included in **show** command outputs	A RUM acknowledgement (ACK) includes the Smart Account and Virtual Account that was reported to, in CSSM. You can then display account information using various **show** commands. The account information that is displayed is always as per the latest available ACK on the product instance. In the command reference of the corresponding release, see the **show license summary**, **show license status**, **show license all**, and **show license tech** privileged EXEC commands.
Cisco IOS XE Cupertino 17.7.1	Smart Licensing Using Policy	Smart Licensing Using Policy was implemented on the following product instances: • C9500X-28C8D, which was introduced in this release. C9500X-28C8D is part of the new Cisco Catalyst 9500X Series Switches, which is still part of the overall Cisco Catalyst 9500 Series Switches. • Catalyst 9600 Series Supervisor Engine 2 (C9600X-SUP-2), which was introduced this release • Cisco Catalyst 9400 Series Supervisor Modules 2 and 2XL (C9400X-SUP-2 and C9400X-SUP-2XL), which were introduced in this release

Release	Feature	Feature Information
Cisco IOS XE Cupertino 17.8.1	Export Control Key for High Security (HSECK9 key)	This feature was implemented on the following product instances: • Cisco Catalyst 9500X Series Switches • Catalyst 9600 Series Supervisor Engine 2 with associated line cards. See Authorization Code, on page 3. On product instances where the HSECK9 key is supported, you can obtain and install Smart Licensing Authorization Code (SLAC) for the HSECK9 key, by implementing one of these topologies: • Workflow for Topology: Connected to Cisco SSM Through CSLU, on page 27 • Workflow for Topology: Connected Directly to Cisco SSM, on page 31 • Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33 • Workflow for Topology: No Connectivity to Cisco SSM and No CSLU, on page 37 • Workflow for Topology: SSM On-Prem Deployment, on page 39

Release	Feature	Feature Information
Cisco IOS XE Cupertino 17.9.1	New mechanism to send data privacy related information	A new mechanism to send all data privacy related information was introduced. This information is no longer included in a RUM report. If data privacy is disabled (**no license smart privacy** {**all** | **hostname** | **version**}} global configuration command), data privacy related information is sent in a separate sync message or offline file. Depending on the topology you have implemented, the product instance initiates the sending of this information in a separate message, or CSLU and SSM On-Prem initiates the retrieval of this information from the product instance, or this information is saved in the offline file that is generated when you enter the license smart save usage privileged EXEC command In the command reference of the corresponding release, see the **license smart** global configuration command.
	Hostname support	If you configure a hostname on the product instance and disable the corresponding privacy setting (**no license smart privacy hostname** global configuration command), hostname information is sent from the product instance. Depending on the topology you have implemented, the hostname information is received by CSSM, and CSLU or SSM On-Prem. It is then displayed on the corresponding user interface. In the command reference of the corresponding release, see the **license smart** global configuration command.
	Trust code request and installation	From this release, trust code request and installation is supported in the CSLU-initiated mode as well. See Trust Code, on page 6, Workflow for Topology: Connected to Cisco SSM Through CSLU, on page 27, and Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33.
	RUM Report Throttling	

Release	Feature	Feature Information
		For all topologies where the product instance initiates communication, the minimum reporting frequency is throttled to one day. This means the product instance does not send more than one RUM report a day. The affected topologies are: *Connected Directly to CSSM*, *Connected to CSSM Through CSLU* (product instance-initiated communication), *CSLU Disconnected from CSSM* (product instance-initiated communication), and *SSM On-Prem Deployment* (product instance-initiated communication). You can override the reporting frequency throttling, by entering the **license smart sync** command in privileged EXEC mode. This triggers an on-demand synchronization with CSSM or CSLU, or SSM On-Prem, to send and receive any pending data. RUM report throttling also applies to the Cisco IOS XE Amsterdam 17.3.6 and later releases of the 17.3.x train, and Cisco IOS XE Bengaluru 17.6.4 and later releases of the 17.6.x train. From Cisco IOS XE Cupertino 17.9.1, RUM report throttling is applicable to *all* subsequent releases. See Workflow for Topology: Connected to Cisco SSM Through CSLU, on page 27, Workflow for Topology: Connected Directly to Cisco SSM, on page 31, Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33, and Workflow for Topology: SSM On-Prem Deployment, on page 39.
	Smart Licensing Using Policy	This feature was implemented on C9200CX-12P-2X2G, C9200CX-8P-2X2G, and C9200CX-12T-2X2G models of the Cisco Catalyst 9200CX Series Switches.

Release	Feature	Feature Information
Cisco IOS XE Dublin 17.11.1	Export Control Key for High Security (HSECK9 key)	This feature was implemented on Cisco Catalyst 9400 Series Supervisor 2 and 2XL Modules (C9400X-SUP-2 and C9400X-SUP-2XL). See Authorization Code, on page 3. On product instances where the HSECK9 key is supported, you can obtain and install Smart Licensing Authorization Code (SLAC) for the HSECK9 key, by implementing one of these topologies: • Workflow for Topology: Connected to Cisco SSM Through CSLU, on page 27 • Workflow for Topology: Connected Directly to Cisco SSM, on page 31 • Workflow for Topology: CSLU Disconnected from Cisco SSM, on page 33 • Workflow for Topology: No Connectivity to Cisco SSM and No CSLU, on page 37 • Workflow for Topology: SSM On-Prem Deployment, on page 39

Use Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn